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# LOW-CUTTING DEVICES FOR HARVESTING CORN[1]

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## INTRODUCTION

Removal of all cornstalks from the field for later shredding, ensiling, or burning is one of the most effective means of controlling the European corn borer. For satisfactory control by this method, it is necessary that the stalks be cut off at ground level, thereby leaving no stubble. By this means most of the borers can be removed from the field in the stalks.

The standard corn binder will not cut closer to the ground than 5 or 6 inches. In the resulting stubble there may be a sufficient number of borers to cause an increasing amount of infestation the following year. Hand cutting with an ordinary corn knife leaves stubble considerably longer, which may contain even more borers. As a result of exhaustive tests under a wide variety of field conditions, the Division of Agricultural Engineering has developed an effective low-cutting attachment for four makes of corn binders and a low-cutting hand device or hoe, either of which can be made at little cost.

## LOW-CUTTING ATTACHMENT FOR CORN BINDERS

The low-cutting attachment developed for the Case-Osborne, John Deere, Massey-Harris, and McCormick-Deering corn binders consists essentially of (1) a long stationary knife set a short distance ahead of the regular sickle, to cut the stalks at the surface of the ground; (2) an elevating chute to lift the stalks so they will not be cut again by the sickle; and (3) an extension butt gatherer chain and extra throat springs, to grasp the stalks as they are cut and carry them through the machine. As the binder moves forward the stationary knife slices the stalks off at ground level. The elevating chute is so shaped, with its central portion somewhat concave and its lower edge slightly rolled under, that weeds and grass are forced to one side where they are cut by the regular sickle to prevent clogging in the throat of the binder.

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[1] Prepared in connection with studies relative to control of the European corn borer which were made in cooperation with the Bureau of Entomology, United States Department of Agriculture.

[2] Mr. Irons developed the attachments for the corn binders, being assisted by D. A. Isler in the preliminary work; Mr. Parvis developed the low-cutting knife for hand harvesting.

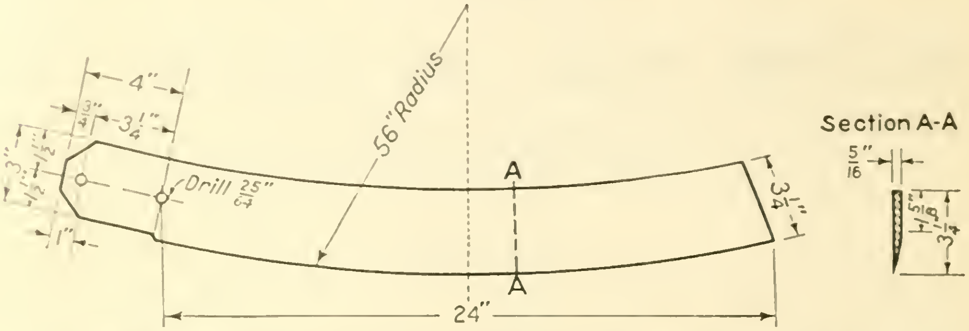


Figure 1.—Stationary knife for low-cutting attachment for corn binders

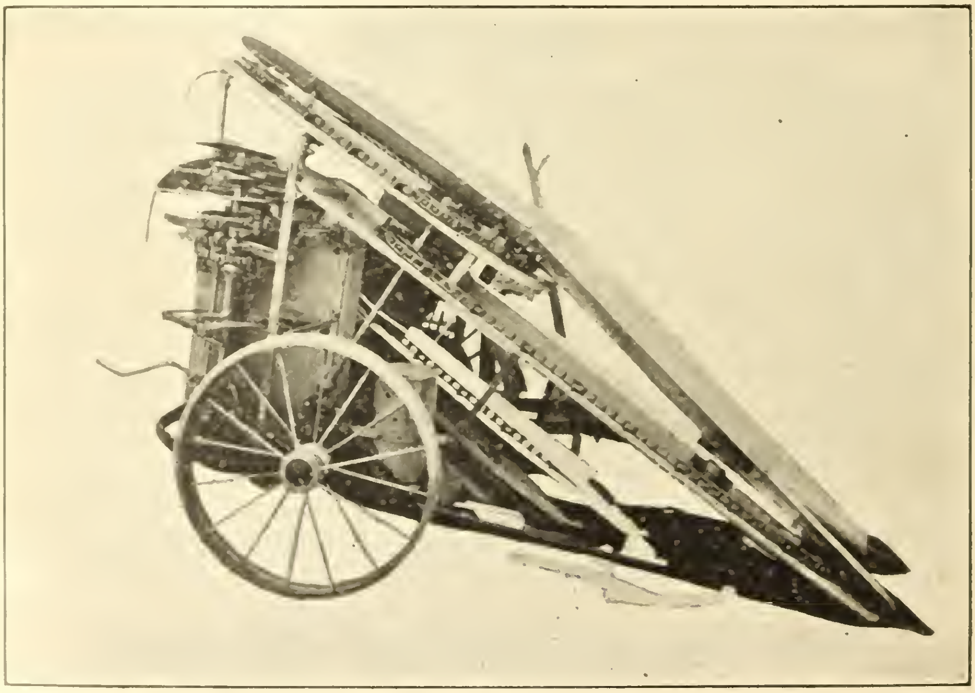


Figure 2.—Side view of Case-Osborne corn binder with low-cutting attachment

The extension chain and the throat springs are purchased from the binder manufacturers. The stationary knife and most of the other parts can be made in the farm shop from material purchased at a hardware store, if the shop has a forge and drill and the tools used with them. If there is no forge on the farm, a few of the pieces will need to be made at a blacksmith shop. The lists of materials and binder parts required for making the low-cutting devices for the four binders are given in Tables 1, 2, 3, and 4. Dimension drawings and instructions for making the parts that are not to be obtained from the binder manufacturers are given in the following pages. The terms left and right are used to mean toward the left or toward the right of the person operating the binder as he sits on the seat of the machine.

### THE STATIONARY KNIFE

The stationary knife of the low-cutting attachment is the same for all four makes of binders, and is shown in Figure 1. It is shown in position on the Case-Osborne binder in Figure 2, on the John Deere binder in Figure 24, on the Massey-Harris binder in Figure 37, and on the McCormick-Deering binder in Figure 58.

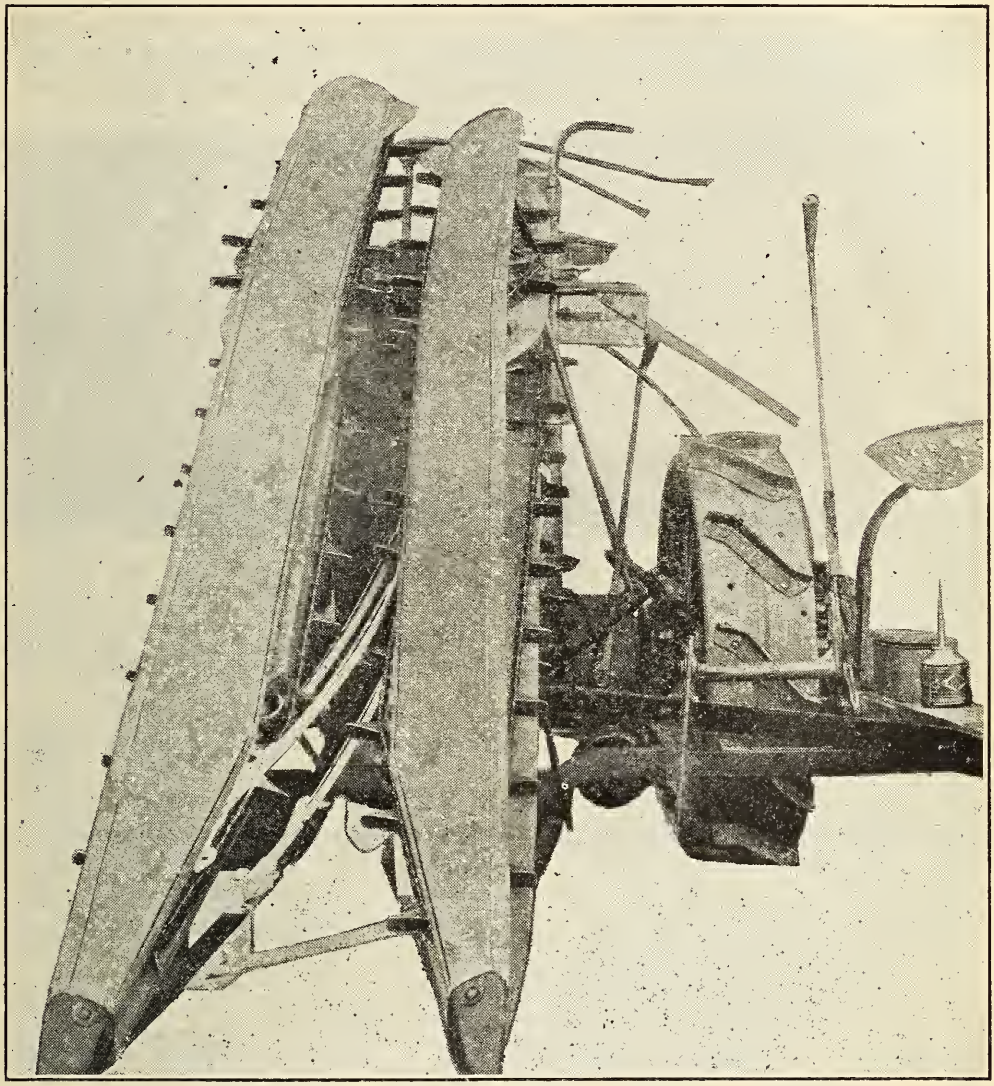


FIGURE 3.—Front view of Case-Osborne corn binder with low-cutting attachment

This knife is made from a piece of spring steel 3 by $\frac{5}{16}$ by 28 inches. It is curved to an arc of a circle of 56 inches radius, and is beveled on the underside. The curve and bevel are obtained by heating and hammering along one edge of the steel until it assumes the curve and cross section shown in Figure 1. The arc can be laid out on the shop floor with a piece of chalk, driving a nail for the center of the circle and using a piece of string for the radius. The hammering widens the knife to about 3¼ inches. The shank where the holes are drilled is not curved or beveled. The edge of the knife is finished by grinding.

It is important that the bevel be on the underside of the knife, that the blade have the proper curve, and that the bolt holes be located accurately. Two ⅜-inch plow bolts are used to fasten the knife to the knife bracket, (see later descriptions).

### ASSEMBLY FOR CASE-OSBORNE CORN BINDER

Side and front views of the Case-Osborne corn binder, with the complete low-cutting device attached, are shown in Figures 2 and 3, though some of the parts are hidden. All the parts of the device for this machine are shown in Figure 4. The bill of materials to be purchased is given in Table 1. Construction drawings are given as Figures 5 to 23, inclusive.

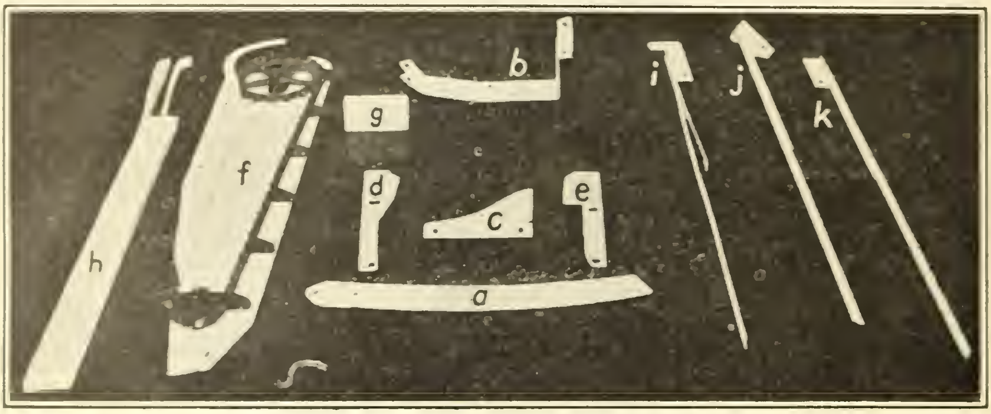


FIGURE 4.—Separate parts of low-cutting attachment for Case-Osborne corn binder: *a*, Stationary knife; *b*, knife bracket, with connecting plate attached; *c*, elevating chute; *d*, *e*, right and left side knifes recut; *f*, special chain board with special gatherer chain and sprockets, backing strips, strippers, and connecting bracket; *g*, support block for special chain board; *h*, special backing board, with regular strippers; *i*, *j*, *k*, upper front, lower special, and under front throat springs with special brackets

TABLE 1.—*Bill of materials for low-cutting attachment for Case-Osborne corn binder*

| Material | Size | Used for— | Figure No. | New bolts and rivets required [1] |
|---|---|---|---|---|
| Spring steel | 3 by 5/16 by 28 inches | Stationary knife | 1 | 2 plow bolts, ⅜ by 1¼ inches. |
| Mild steel | 4 by 5/16 by 24½ inches | Knife bracket | 5 | 4 machine bolts, ⅜ by 1 inch. |
| Do | 4¼ by 3/16 by 9¾ inches | Elevating chute | 8 | None. |
| Do | 3 by ⅜ by 3⅞ inches | Connecting bracket | 19 | 1 machine bolt, ⅜ by ¾ inch.<br>2 carriage bolts, 5/16 by 1¼ inches. |
| Bar iron | 1½ by 5/16 by 7¼ inches | Connecting plate | 7 | 2 machine bolts, ⅜ by 1 inch. |
| Do | 1 by 3/16 by 21 inches | Upper special stripper | 15 | None. |
| Do | 1 by 3/16 by 14 inches | Special brace | 18 | None. |
| Angle iron | 2 by 2 by 3/16 by 10 inches | Upper front throat spring bracket. | 20 | 1 carriage bolt, 5/16 by 3¼ inches.<br>2 rivets ¼ by ¾ inch. |

[1] The total new bolts and rivets which it is necessary to procure are as follows: 2 plow bolts, ⅜ by 1¼ inches, 8 machine bolts, ⅜ by 1 inch; 1 machine bolt, ⅜ by ¾ inch; 6 rivets, ¼ by ¾ inch; these carriage bolts, 1, 7/16 by 4 inches; 1, 7/16 by 3¼ inches; 2, ⅜ by 5½ inches; 5, ⅜ by 4½ inches; 3, 5/16 by 6½ inches; 2, 5/16 by 3¼ inches; 2, 5/16 by 1¾ inches; 2, 5/16 by 1¼ inches.

TABLE 1.—*Bill of materials for low-cutting attachment for Case-Osborne corn binder*—Continued

| Material | Size | Used for— | Figure No. | New bolts and rivets required |
|---|---|---|---|---|
| Angle iron | 1½ by 1½ by 3/16 by 6½ inches. | Under front throat spring bracket. | 21 | 1 carriage bolt, 7/16 by 3¼ inches.<br>1 carriage bolt, 5/16 by 3¼ inches.<br>2 rivets, ¼ by ¾ inch. |
| Do | 2½ by 1¼ by 3/16 by 6 inches. | Lower special throat spring bracket. | 22 | 2 machine bolts, ⅜ by 1 inch.<br>2 rivets, ¼ by ¾ inch. |
| Sheet iron | 20-gage, 3⅛ by 14¼ inches | Lower special stripper | 16 | None. |
| Oak | 3¼ by 1¼ by 23 inches | Rear special backing strip | 12 | 3 carriage bolts, ⅜ by 4½ inches. |
| Do | 3¼ by 1¼ by 10¾ inches | Front special backing strip | 13 | 2 carriage bolts, ⅜ by 4½ inches. |
| Do | 3¼ by ⅞ by 40 inches | Special backing board | 23 | 3 carriage bolts, 5/16 by 6½ inches. |
| Pine | 10 by ⅞ by 54½ inches | Special chain board | 11 | 2 carriage bolts, 5/16 by 1¾ inches.<br>1 carriage bolt, 7/16 by 4 inches. |
| Do | 3¼ by 1½ by 6 inches | Support block | 17 | 2 carriage bolts, ⅜ by 5½ inches. |

CASE-OSBORNE CORN-BINDER PARTS

| Number of pieces | Description | Identification |
|---|---|---|
| 50 | Plain conveyor chain links | 47 |
| 13 | Conveyor chain links with lugs | 47 |
| 1 | Drive sprocket with set screw | OS-594 |
| 1 | Sprocket for lower end of chain board | S-199 |
| 1 | Stud bushing for sprocket S-199 | S-60 |
| 1 | Rack for chain tightener | S-518 |
| 1 | Pinion for rack S-518 | S-519 |
| 1 | Spring strap holder | S-593 |

JOHN DEERE CORN-BINDER PARTS

| | | |
|---|---|---|
| 3 | Short throat springs | H-1201 |

**Knife bracket.**—The knife bracket, (fig. 5), which holds the stationary knife, is fastened to the right gatherer angle and right gatherer angle brace. The front connection is made direct, the rear connection by means of the connecting plate described in the next paragraph. The steel plate for the bracket is cut to dimensions as shown at A in Figure 5. Shaping it will be easiest if the lugs at the forward end are formed first. The tops of the lugs are trimmed to go under the flanges of the gatherer angle and brace. The holes to be bored in the gatherer angle and brace are shown in Figure 6.

**Connecting plate.**—The connecting plate, (fig. 7), for fastening the rear of the knife bracket to the right gatherer angle and brace is placed as shown in Figure 6. The upturned end is twisted slightly, as shown in Figure 7.

**Elevating chute.**—The elevating chute, (figs. 8 and 9), is made by cutting the steel plate as shown at A in Figure 8, and then hammering it to the shape shown at B (fig. 8) and by Figure 9. The central portion is somewhat concave, the lower edge is rolled under slightly to prevent dragging grass or trash, and the outside rear corner is flared up to prevent the stalks from sliding off into the sickle. Care should be taken to give this chute just the proper shape. Much of the finishing work can be done with the hammer without heating the metal. The chute is fastened to the left throat angle just below the left side knife by the bolts that hold the side knife.

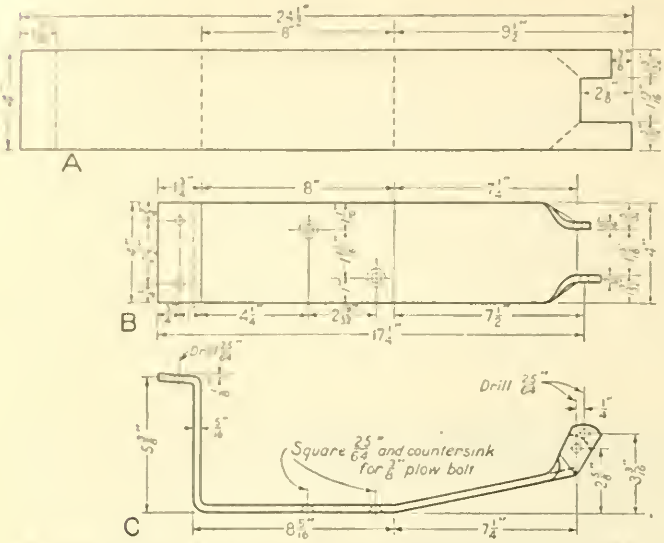


FIGURE 5.—Knife bracket for Case-Osborne corn binder

**Side knives.**—The side knives on the binder must be partly cut away as shown in Figure 10, the left one to give space for the elevating chute and the right one to give clearance for grass and weeds to be cut by the sickle. The right knife is to be sharpened as marked in the figure.

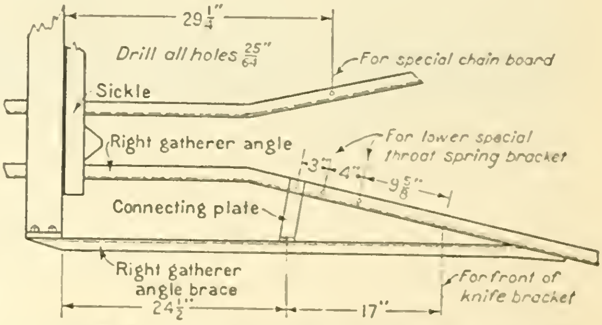


FIGURE 6.—Special holes required in gatherer angles and brace, Case-Osborne corn binder

**Pitman.**—The pitman of the binder must be lengthened so that the sickle section will register with the right side knife; that is, when the sickle is in its extreme right position the center of the sickle section must be over the cutting edge of the right side knife.

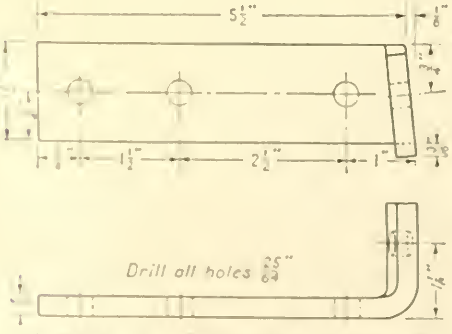


FIGURE 7.—Connecting plate for knife bracket, Case-Osborne corn binder

**Left gatherer chain.**—The left gatherer chain on the binder should be reversed, so that the flat sides of the lugs in the throat are toward the rear of the machine, in order to secure a more positive elevating action by the chain.

**Special chain board.**—A special chain board, (fig. 11), must be made to support the special gatherer chain assembly described in the following paragraph. The maximum width when finished should be 9¼ inches at the rear, and the width a little forward of the middle should be 8⅜ inches, as shown in the figure. The beveling at the front end is on the underside of the board.

**Special gatherer chain.**—A special gatherer chain must be placed between the regular butt-conveyor chain and the left gatherer chain. The sheet-iron shield under the left gatherer chain board is removed, and the special extension chain on its special board (described in the preceding paragraph), is put in place, as shown in Figure 2. The chain consists of 50 plain conveyor-chain links and 13 conveyor-chain links with lugs, 4 plain links between each two lugged links, except in two cases where there are only 3 plain links. (Both plain and lugged links are bought as Case-Osborne corn-binder parts No. 47.) The chain should be so placed that the flat side of each lug in the throat is toward the rear, to give a positive elevating action.

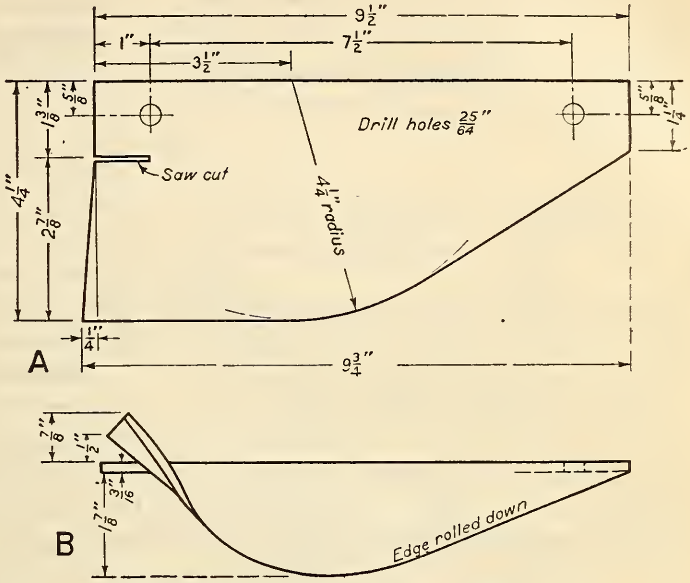


FIGURE 8.—Drawings of elevating chute, Case-Osborne corn binder

This chain is driven by a sprocket (OS–594) placed on the left conveyor drive shaft just above the special chain board, leaving only enough clearance between the sprocket and the board for freedom of action. To get this sprocket on the shaft, the regular left gatherer chain board must be removed. A hole about one-fourth inch deep is drilled in the shaft to take the sprocket set screw. The idler

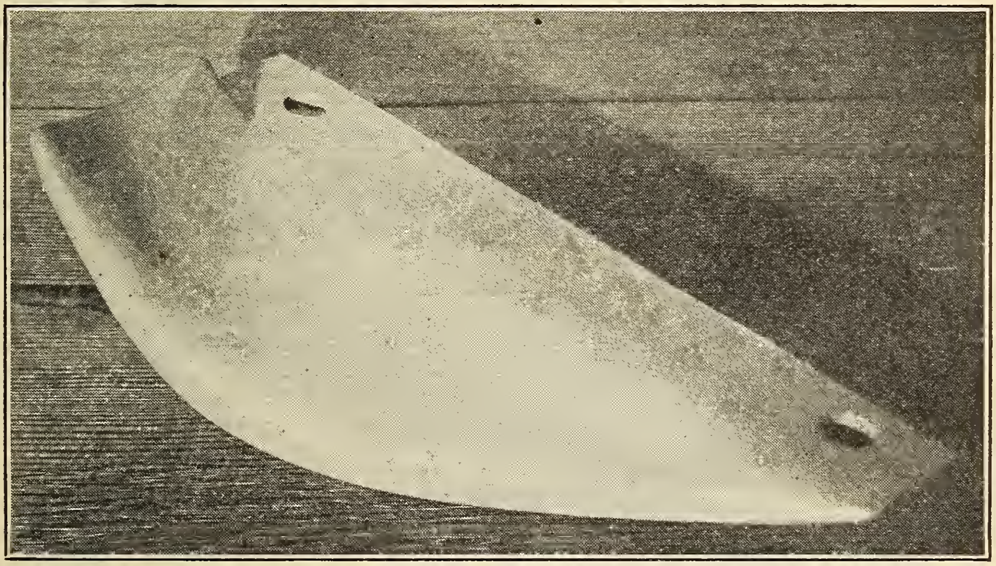


FIGURE 9.—Photograph of elevating chute, Case-Osborne corn binder

sprocket (S-199) and its assembly (stud bushing, S-60; rack for chain tightener, S-518; pinion, S-519; and spring strap holder, S-593) are mounted on the lower end of the special chain board. That board, with chain and sprockets in position, is shown in Figure 4.

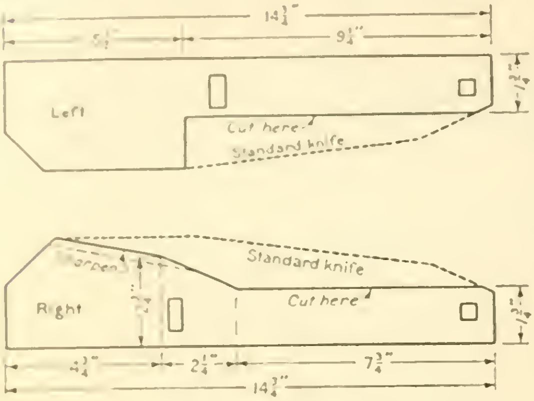


FIGURE 10.—Side knives recut, Case-Osborne corn binder

**Special backing strips.**—Special backing strips, (figs. 12 and 13), are necessary to hold the special gatherer chain against the stalks cut by the knife. Bolted in place on top of the special gatherer chain board as shown in Figure 4, the two backing strips fit together as shown in Figure 14.

**Special strippers.**—Special strippers, (figs. 15 and 16), are required for the special gatherer chain. The upper special stripper is held in the slot in the rear backing strip, (fig. 12), by two of the bolts which hold that strip to the special chain board. The lower special stripper is fastened between the rear backing strip and the special chain board by the rear bolt through the backing strip and a wood screw near the end of the board. The upper special stripper is shown in place on the backing strip at *f* in Figure 4. The lower stripper is hidden by the sprocket and chain.

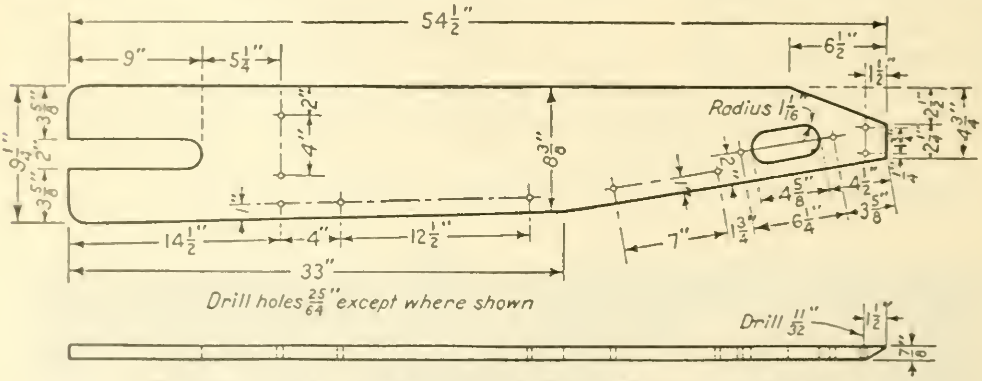


FIGURE 11.—Special chain board, Case-Osborne corn binder

**Support block.**—The support block, (fig. 17), rests upon the butt chain board of the binder and supports the rear end of the special gatherer chain board. (Fig. 11.)

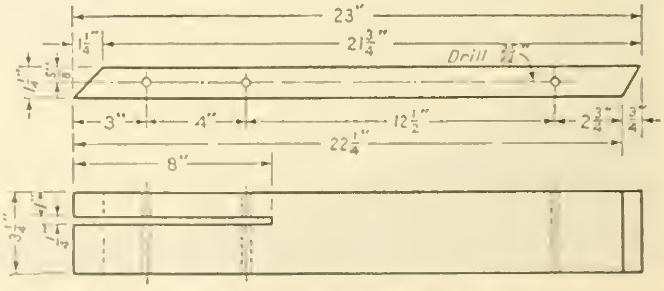


FIGURE 12.—Rear special backing strip, Case-Osborne corn binder

**Special brace.**—The special brace, (fig. 18), is bolted between the special gatherer chain board and the left gatherer chain board above.

It is fastened to the special chain board by the left bolt through the support block, (fig. 17), and to the left gatherer chain board by the bolt just above this.

**Connecting bracket.**—The connecting bracket (fig. 19), fastens the front end of the special gatherer chain board to the left gatherer angle. A bolt hole for making the connection must be bored in the left gatherer angle as shown in Figure 6.

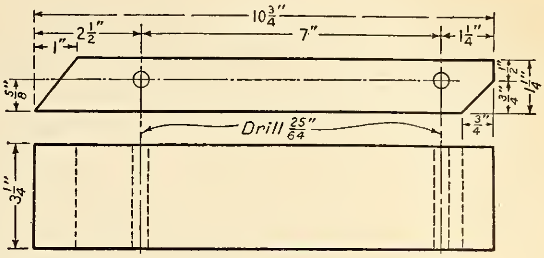


FIGURE 13.—Front special backing strip, Case-Osborne corn binder

**Throat springs.**—Three John Deere short throat springs, (H–1201) are required with the low-cutting device on the Case-Osborne corn binder, one of which is put in place of the upper or retard spring that is part of the regularly equipped machine. These three springs are riveted to the special brackets described in the following paragraphs. The springs with brackets attached are shown in Figure 4.

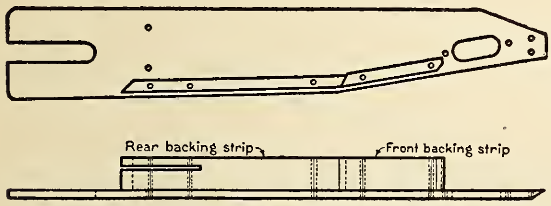


FIGURE 14.—Special backing strips in place on special chain board, Case-Osborne corn binder

**Upper front throat spring bracket.**—The upper front throat spring bracket, (fig. 20), is bolted on top of the right front chain guide, as shown in Figure 2. One leg of the angle iron from which the bracket is made is sawed and flattened down, and the parts are trimmed to the dimensions shown.

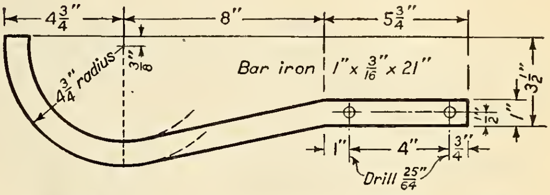


FIGURE 15.—Upper special stripper, Case-Osborne corn binder

**Under front throat spring bracket.**—The under front throat spring bracket, (fig. 21), is bolted in the position originally occupied by the retard spring. Part of one leg of the angle iron from which it is made is flattened down and holes for rivets and bolts made as shown.

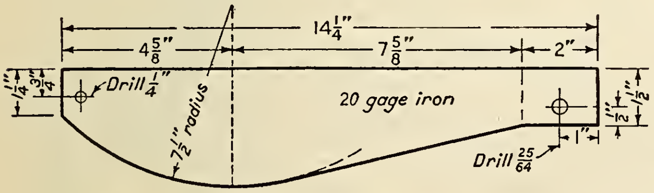


FIGURE 16.—Lower special stripper, Case-Osborne corn binder

**Lower special throat spring bracket.**—The lower special throat spring bracket, (fig. 22), is bolted to the right gatherer angle just ahead of the rear connection of the knife bracket, as shown in Figure 6. In making it, a part of the longer leg of the angle iron is flattened down and shortened as shown at B, (fig. 22), and the other part of the same leg is bent over slightly as shown at D.

**Special backing board.**—The special backing board, (fig. 23), for the left gatherer chain is put in place of the regular backing board

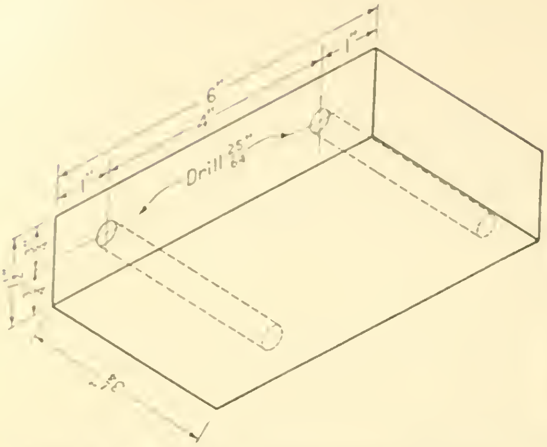


FIGURE 17.—Support block for special chain board, Case-Osborne corn binder

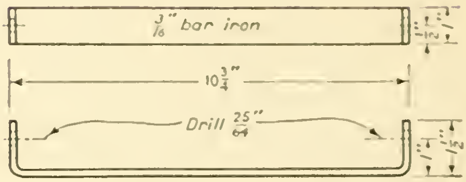


FIGURE 18.—Special brace for special chain board, Case-Osborne corn binder

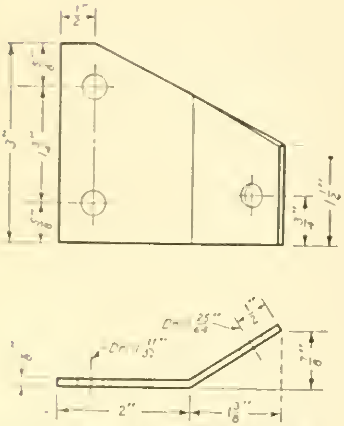


FIGURE 19. — Connecting bracket for special chain board, Case-Osborne corn binder

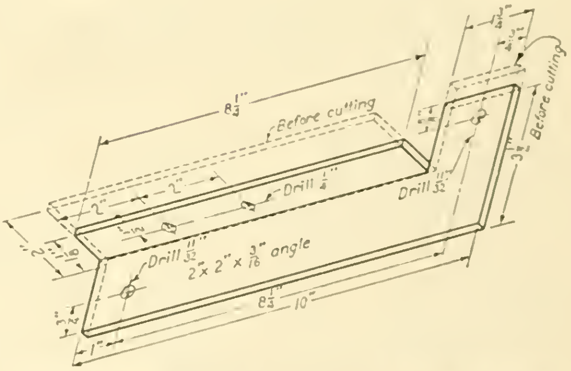


FIGURE 20.—Upper front throat spring bracket, Case-Osborne corn binder

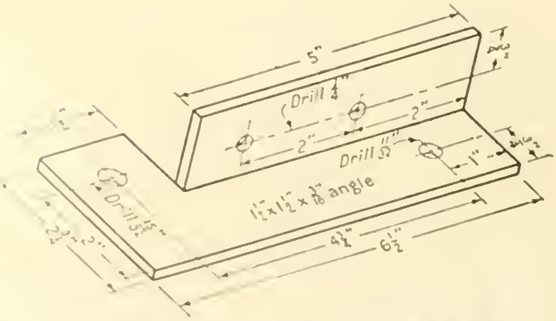


FIGURE 21.—Under front throat spring bracket, Case-Osborne corn binder

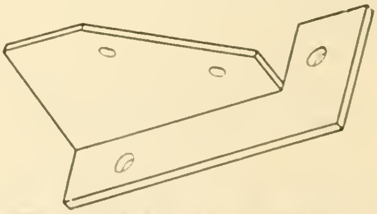


FIGURE 22A.—Lower special throat spring bracket, Case-Osborne corn binder

or chain guide on top of the left gatherer chain board, and the regular backing board is placed on the underside of the chain board for the under front throat spring to rest against. The two backing boards are fastened to the chain board with the same three bolts, using the original holes in the chain board. The slot in the rear end of the special backing board is to receive the regular stripper that fitted on top of the regular backing board. The special backing

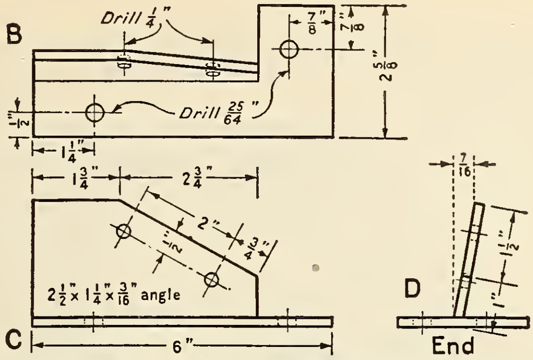


FIGURE 22 B, C, D.—Lower special throat-spring bracket, Case-Osborne corn binder

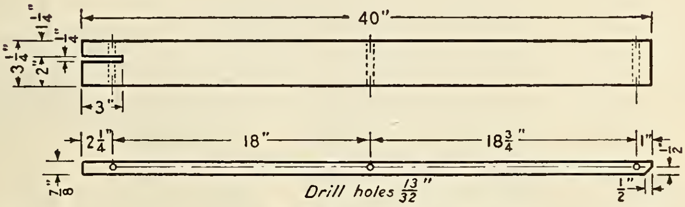


FIGURE 23.—Special backing board, Case-Osborne corn binder

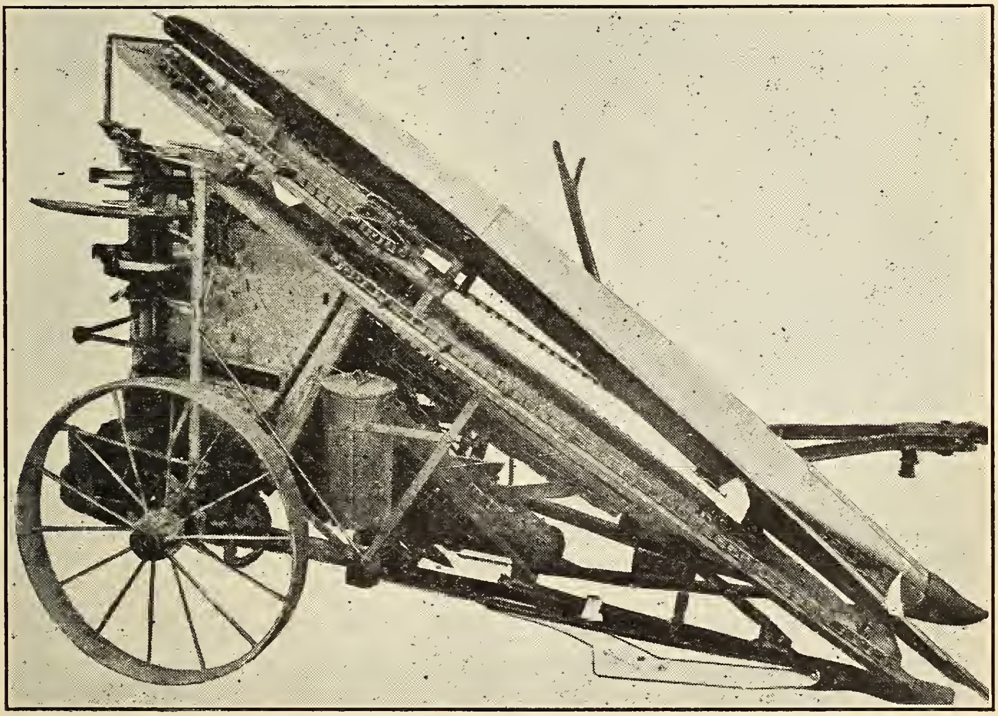


FIGURE 24.—Side view of John Deere corn binder with low-cutting attachment

board, with both strippers for the regular left gatherer chain attached, is shown in Figure 4.

**Left chain board brace.**—When the low-cutting device is installed on this binder, the lower end of the left chain board brace, which ordinarily is fastened to the right side of the left gatherer angle brace, is moved to the left side to allow clearance for the lugs of the special gatherer chain. In doing this, use is made of the small spacer spool that is removed from the right front chain guide when the upper front throat spring bracket is attached. Six inches of material are cut away from the lower part of the sheet-iron shield so that it will fit above the special gatherer chain.

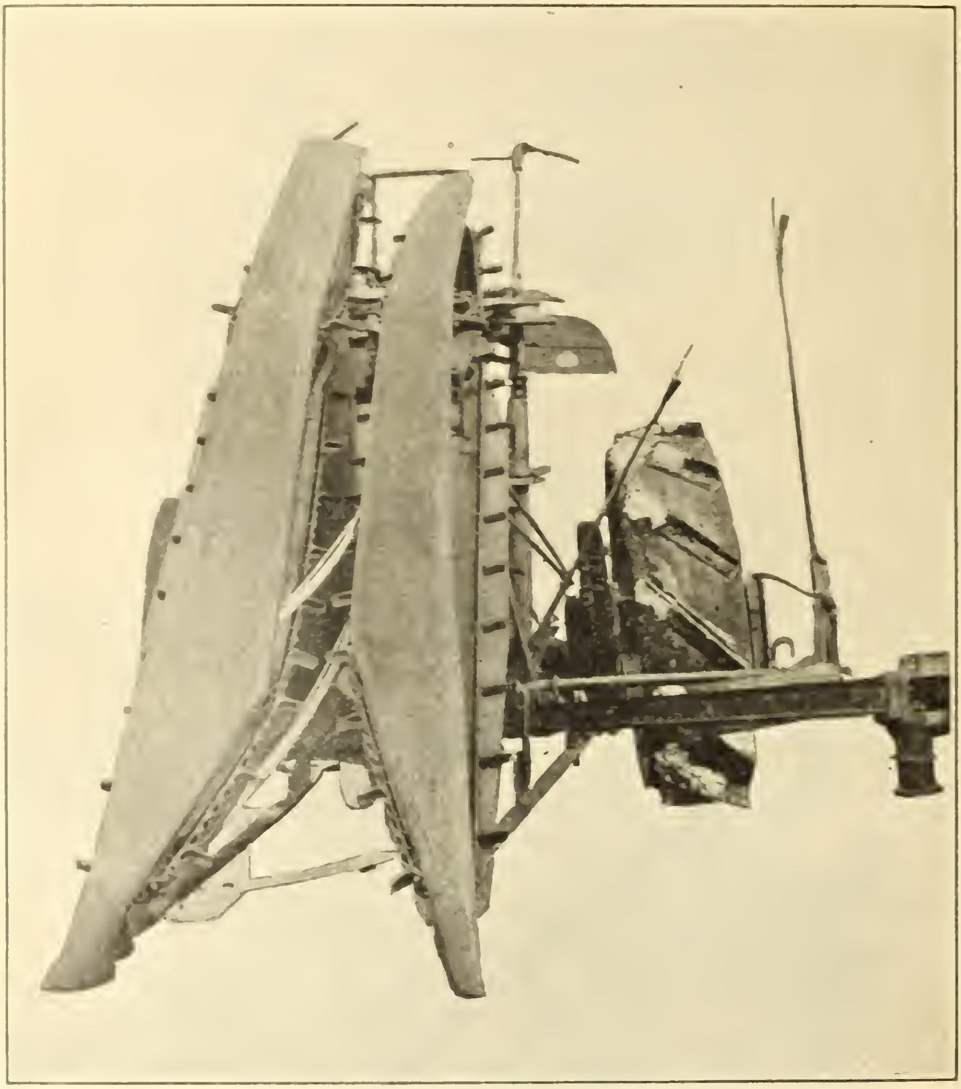


FIGURE 25.—Front view of John Deere corn binder with low-cutting attachment

## ASSEMBLY FOR JOHN DEERE CORN BINDER

Side and front views of the John Deere corn binder with the complete low-cutting device attached are shown in Figures 24 and

25. The separate parts of the device, except the extension butt chain and its special board and mountings that are to be purchased from the binder manufacturer, are pictured in Figure 26. All materials required for this device, including standard binder parts, are listed in Table 2. Construction drawings for the parts to be made are given in Figures 27 to 36. All necessary explanations of those drawings, and of the installation of all the parts, are given in the following pages.

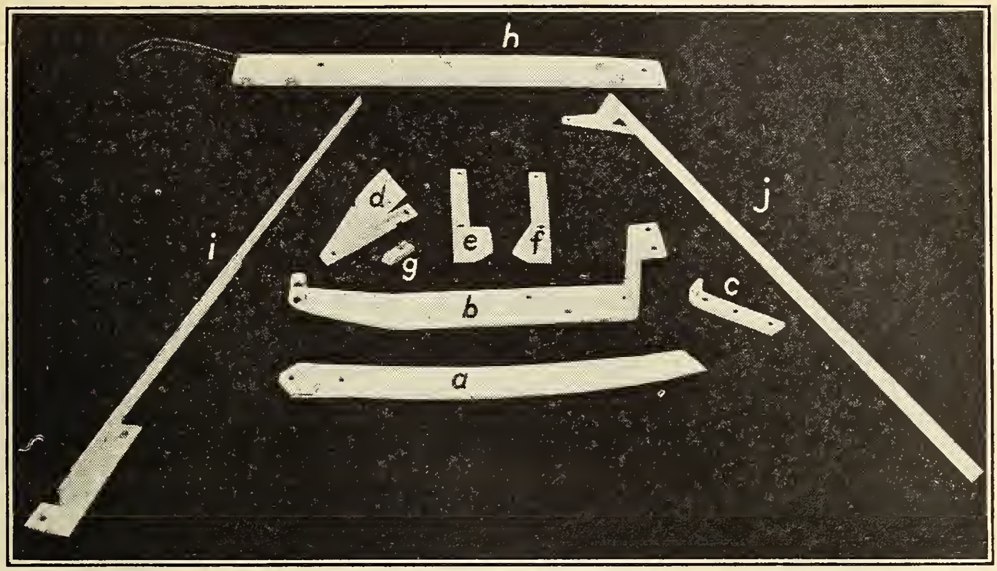


FIGURE 26.—Separate parts of low-cutting attachment for John Deere corn binder: *a*, Stationary knife; *b*, knife bracket; *c*, connecting plate for knife bracket; *d*, elevating chute; *e*, *f*, left and right knives recut; *g*, spacer block for elevating chute; *h*, special backing board; *i*, *j*, lower and upper front throat springs with brackets

TABLE 2.—*Bill of materials for low-cutting attachment for John Deere corn binder*

| Material | Size | Used for— | Figure No. | New bolts and rivets required[1] |
|---|---|---|---|---|
| Spring steel | 3 by 5/16 by 28 inches | Stationary knife | 1 | 2 plow bolts, ⅜ by 1¼ inches. |
| Mild steel | 4 by 5/16 by 34 inches | Knife bracket | 27 | 1 machine bolt, ⅜ by 3 inches.<br>2 machine bolts, ⅜ by 1 inch. |
| Do | 4⅛ by 3/16 by 10¼ inches | Elevating chute | 30 | 1 machine bolt, 7/16 by 1⅜ inches.<br>1 machine bolt, ⅜ by 1½ inches. |
| Do | 4½ by ¼ by 6½ inches | Upper front throat spring bracket. | 35 | 2 carriage bolts, ⅜ by 1¾ inches.<br>2 rivets, ¼ by ¾ inches. |
| Bar iron | 1½ by 5/16 by 8¼ inches | Connecting plate | 29 | 2 machine bolts, ⅜ by 1 inch. |
| Do | 1 by ½ by 2¾ inches | Spacer block | 32 | None. |
| Angle iron | 1½ by 1½ by 3/16 by 9 inches. | Lower front throat spring bracket. | 34 | 2 rivets, ¼ by ¾ inch. |
| Oak | 5 by ⅞ by 40 inches | Special backing board | 36 | 2 carriage bolts, 5/16 by 5½ inches. |

---

[1] The total new bolts and rivets which it is necessary to procure are as follows: 2 plow bolts, ⅜ by 1¼ inches; 1 machine bolt, 7/16 by 1⅜ inches; 1 machine bolt, ⅜ by 3 inches; 1 machine bolt ⅜ by 1½ inches; 4 machine bolts, ⅜ by 1 inch; 2 carriage bolts, ⅜ by 1¾ inches; 2 carriage bolts, 5/16 by 5½ inches; 4 rivets, ¼ by ¾ inch.

TABLE 2.—*Bill of materials for low-cutting attachment for John Deere corn binder*—Continued

JOHN DEERE CORN BINDER PARTS

| Number of pieces | Description | Identification |
|---|---|---|
| 1 | Extension butt chain (14 links No. 7, and 7 links No. 7-D) | H-2073 |
| 1 | Upper butt chain board with idler sprocket plate and chain stripper | H-2059 |
| 1 | Butt chain idler sprocket and bolt | H-419 |
| 1 | Extension butt chain drive sprocket | H-420 |
| 1 | Stud for sprockets H-419 and H-420 | H-421 |
| 1 | Extension butt chain idler sprocket | H-330 |
| 1 | Extension butt chain idler sprocket stud | H-77 |
| 1 | Machine bolt ½ by 3¾ inches with nut, for H-77. | |
| 2 | Short throat springs with stiffeners | H-1201 |

**Knife bracket.**—The knife bracket, (fig. 27), for holding the stationary knife is shown in position in Figure 24. The forward end may be trimmed to $2\frac{7}{16}$ inches wide for a length of 4 inches before the eyes or loops are formed. The eyes straddle the right gatherer angle and the right gatherer angle brace, the bolt through those eyes replacing the rear bolt that regularly holds the angle and brace together. (Fig. 28.) The rear end of the bracket is bolted to the connecting plate described in the next paragraph.

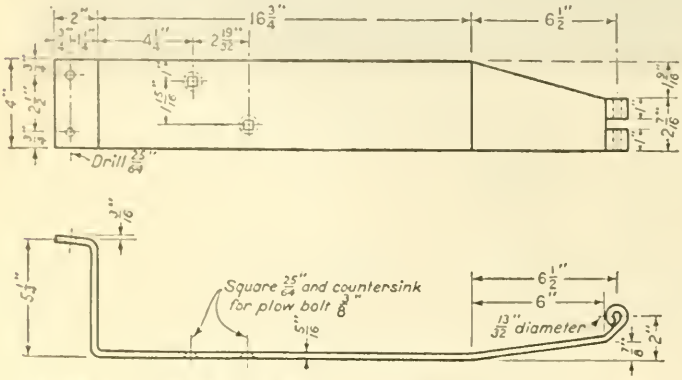


FIGURE 27.—Knife bracket for John Deere corn binder

**Connecting plate.**—The connecting plate, (fig. 29), holds the rear end of the knife bracket. It is bolted to the right gatherer angle and the right gatherer angle brace, in which holes must be drilled as shown in Figure 28.

**Elevating chute.**—The elevating chute, (figs. 30 and 31), is an important part and should be shaped carefully. The flat steel plate is cut to the dimensions shown at A in Figure 30. It then is hammered to the shape shown at B in Figure 30 and in Figure 31. The lower edge is rolled under slightly to prevent dragging grass or trash; the rear portion is made somewhat concave; and the outside corner is flared up to prevent the cornstalks from sliding off into the sickle. Much of the finishing work can be done with the hammer without heating the metal. The chute is fastened to the

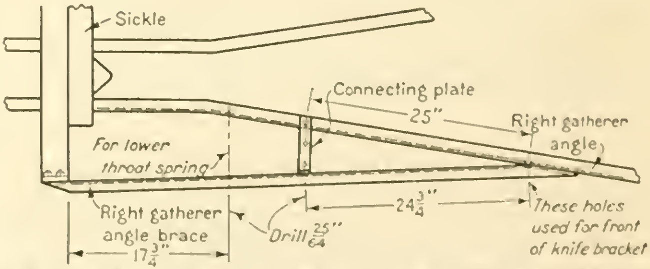


FIGURE 28.—Special holes required in right gatherer angle and brace, John Deere Corn binder

underside of the left gatherer angle by bolts through the left side knife.

**Spacer block.**—A spacer block, (fig. 32), is placed on the front end of the elevating chute under the gatherer angle, to hold the left side of the chute parallel to the top of the gatherer angle.

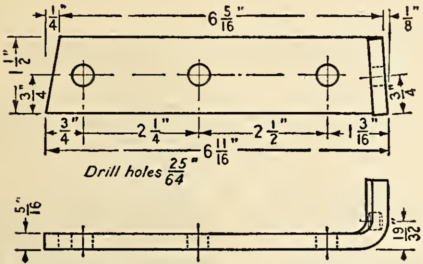


Figure 29.—Connecting plate for knife bracket, John Deere corn binder

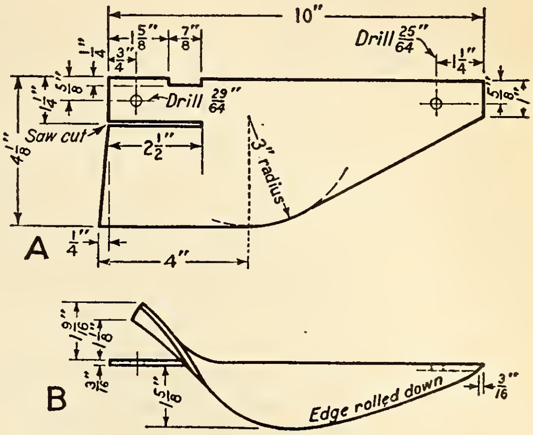


Figure 30.—Elevating chute, John Deere corn binder

**Side knives.**—The side knives, (fig. 33), of the binder must be partly cut away, the left knife to give space for the elevating chute and the right knife to give sufficient clearance to prevent clogging in the throat. The right knife is to be sharpened as shown in the figure.

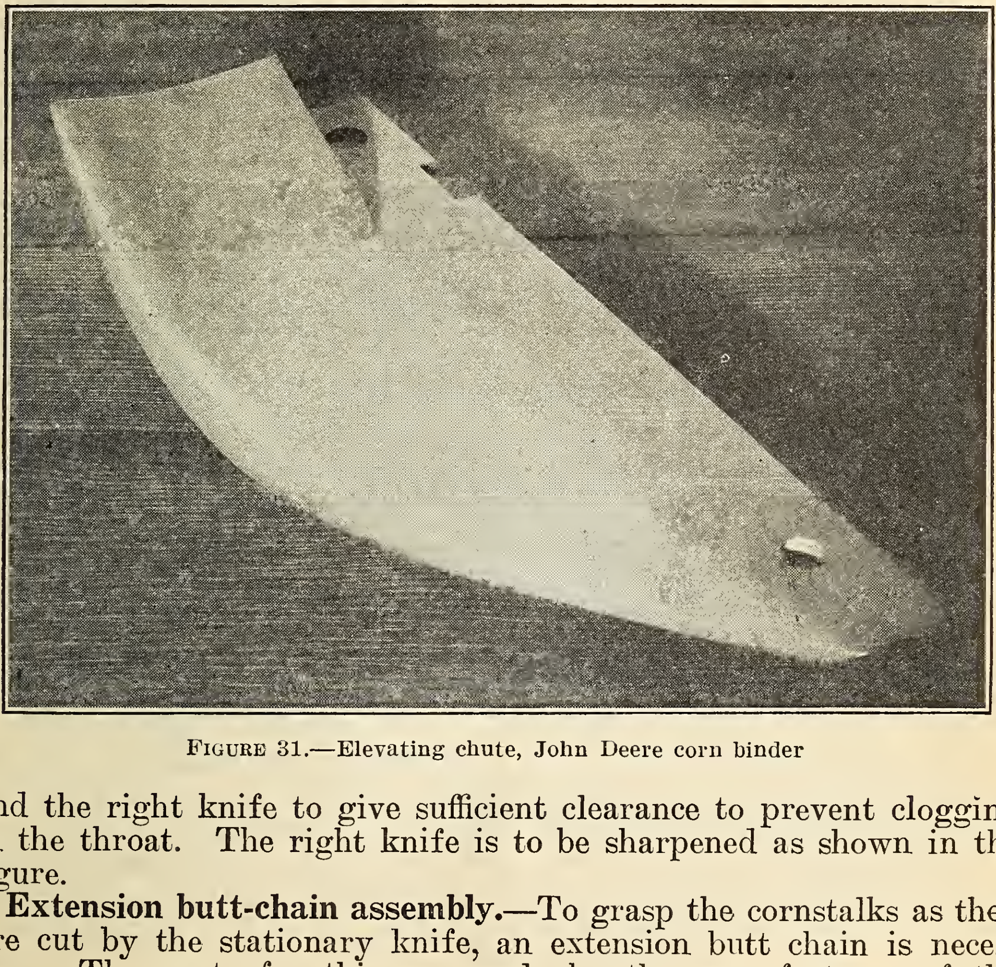


Figure 31.—Elevating chute, John Deere corn binder

**Extension butt-chain assembly.**—To grasp the cornstalks as they are cut by the stationary knife, an extension butt chain is necessary. The parts for this are made by the manufacturer of the binder, and are included in bill of materials. (Table 2.) They are shown in place on the binder in Figure 24. The installation is made as follows:

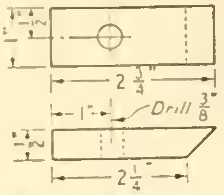


FIGURE 32.—Spacer block for elevating chute, John Deere corn binder.

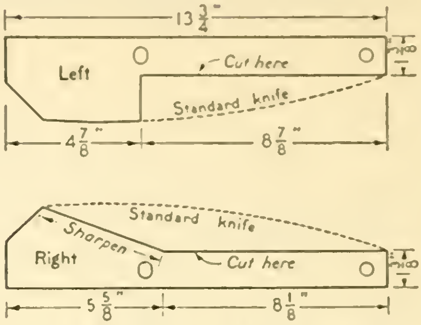


FIGURE 33.—Side knives recut, John Deere corn binder

(1) The regular upper butt-chain board and butt-chain idler sprocket and stud are removed from the binder.

(2) The new butt-chain idler sprocket (H–419) and stud (H–421) are bolted on the lower butt-chain board, and the new upper butt-chain board (H–2059) is bolted in place.

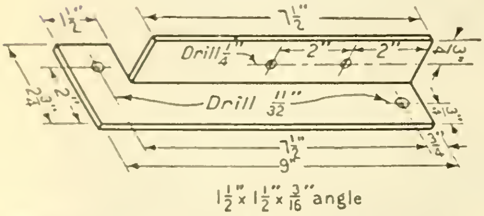


FIGURE 34.—Lower front throat spring bracket, John Deere corn binder

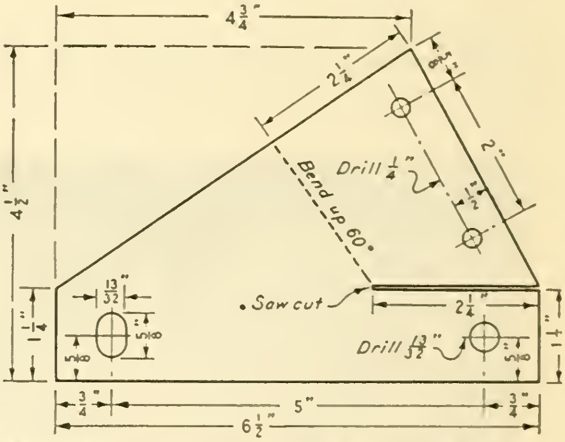


FIGURE 35.—Upper front throat spring bracket, John Deere corn binder

(3) The extension butt-chain drive sprocket (H–420) is put on and secured with the nut.

(4) The expansion butt chain (H–2073) is placed on the drive sprocket (H–420), and the idler sprocket (H–330) and stud (H–77) are put in place at the lower end of the extension butt chain and bolted to the butt-chain board.

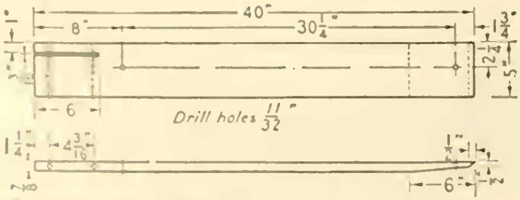


FIGURE 36.—Special backing board, John Deere corn binder

**Special throat springs.**—The John Deere corn binder is regularly equipped with two throat springs. Two additional springs, known as John Deere short throat springs No. H–1201, are necessary with the low-cutting attachment. They are riveted to special brackets described in the following paragraphs.

**Lower front throat spring bracket.**—The lower front throat spring bracket (fig. 34) is made by sawing one leg of the angle iron and flattening down a section of it, as shown in the figure.

The bracket is bolted to the underside of the right gatherer board with the same bolts that hold the right front chain guide in place.

**Upper front throat spring bracket.**—The upper front throat spring bracket, (fig. 35), is bolted to the underside of the forward support bracket for the outer gatherer board, as shown in Figure 24. It is so shaped that the spring rests against the upper part of the special backing board noted below.

**Special backing board.**—A special backing board, (fig. 36), replaces the narrower regular long backing board on the left gatherer board for the upper special front throat spring to rest against.

**Regular lower throat spring.**—The regular lower throat spring and its supporting bracket are moved back on the right gatherer angle, so that the rear of this bracket is held by a bolt through the front of the right side knife. The front of this bracket then is held by a bolt through the right gatherer angle for which a hole must be drilled as shown in Figure 28.

### ASSEMBLY FOR MASSEY-HARRIS CORN BINDER

Side and front views of the Massey-Harris corn binder with the low-cutting device are shown in Figures 37 and 38. (In the side view, one part lies beside the machine instead of being in place for operation.) The special parts of the device are shown separately in Figure 39, except the extra conveyor chain links and fingers. The materials required for making and attaching all parts of the low-cutting device, including regular binder parts, are listed in Table 3. Construction drawings for the parts to be made are shown in Figures 40 to 57. Explanation of the drawings and of the installation of all parts are given in the following pages.

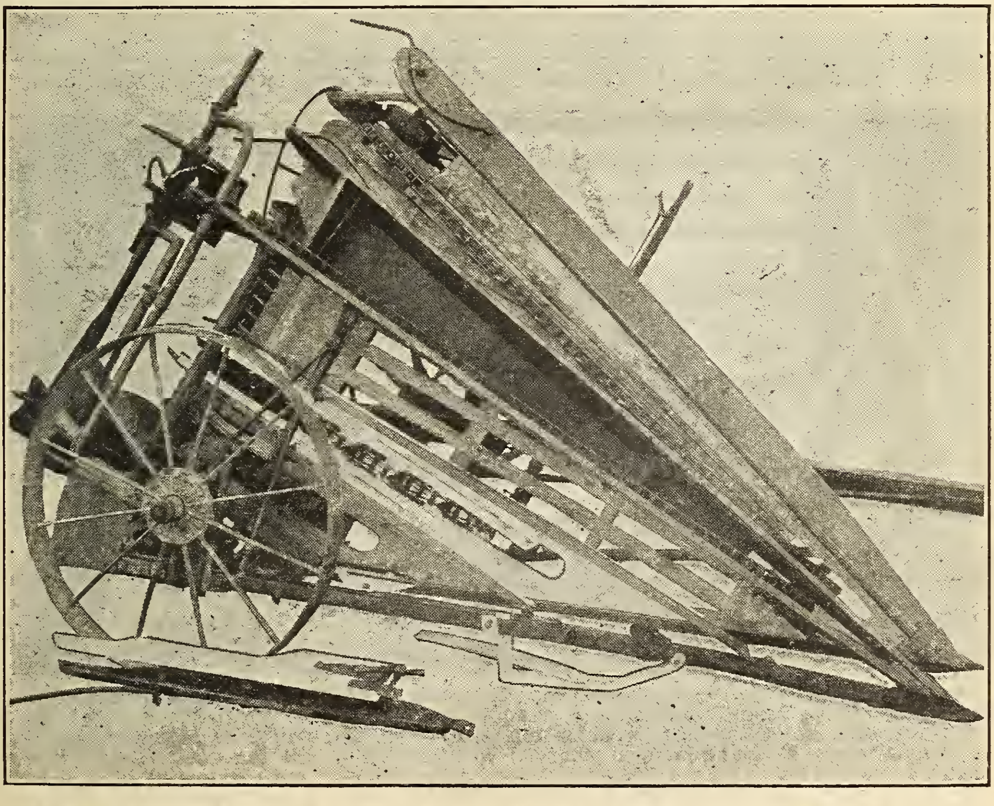


FIGURE 37.—Side view of Massey-Harris corn binder with low-cutting attachment

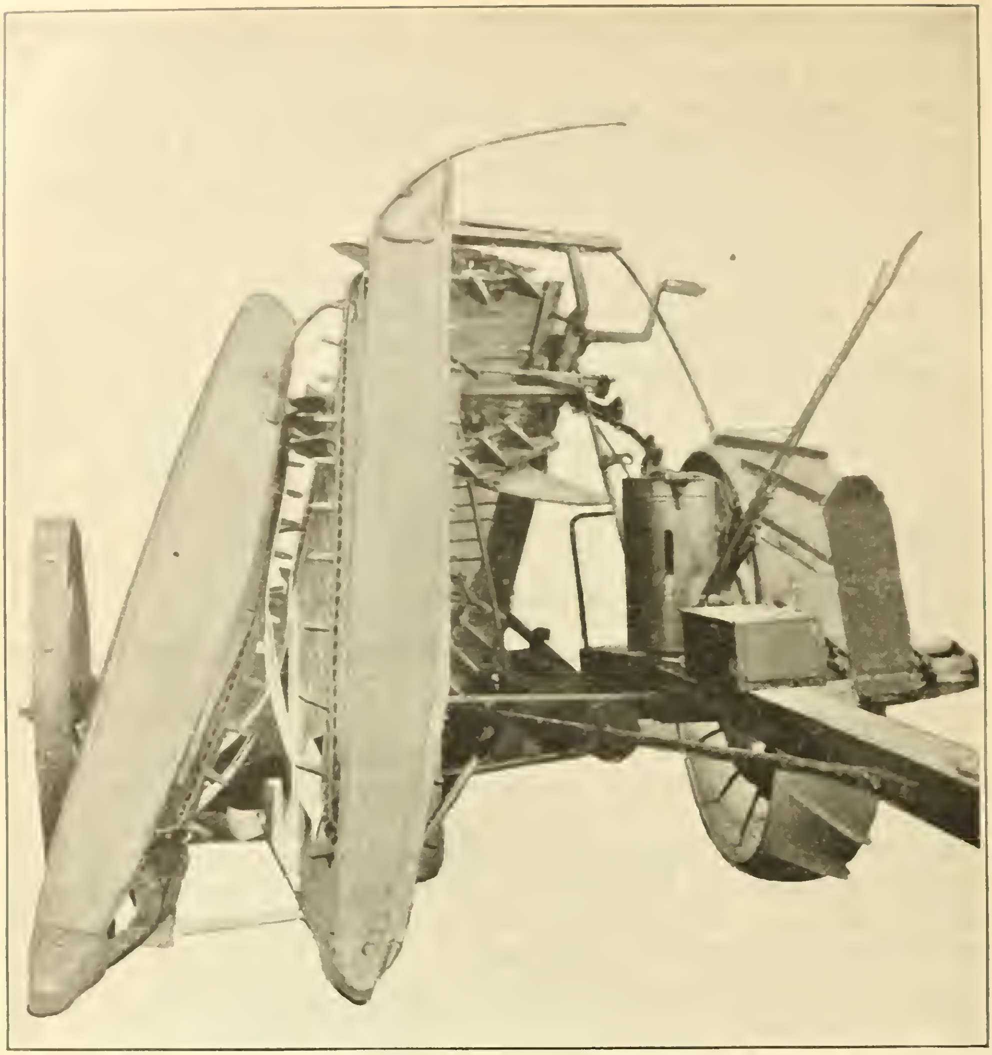


FIGURE 38.—Front view of Massey-Harris corn binder with low-cutting attachment

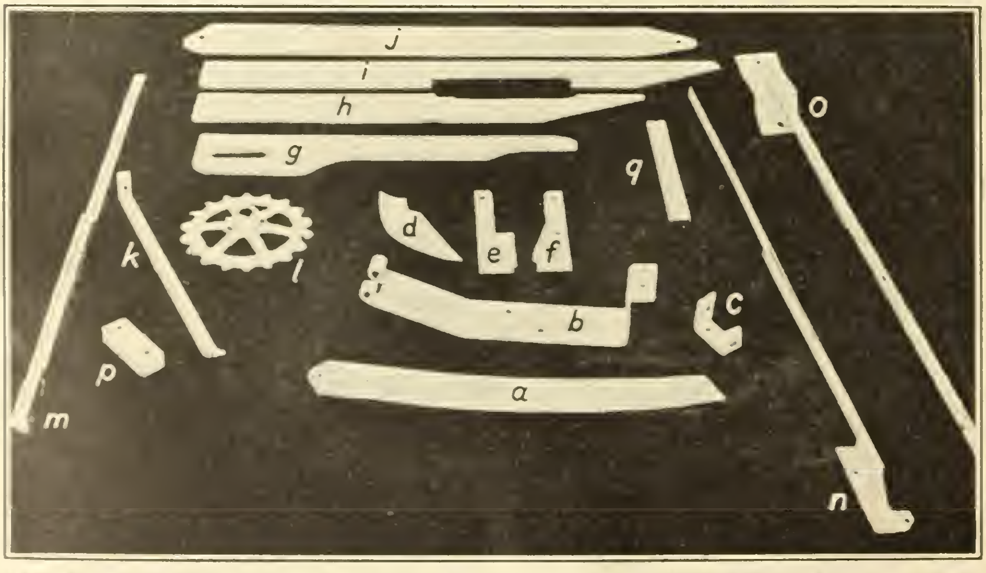


FIGURE 39.—Separate parts of low-cutting attachment for Massey-Harris corn binder: *a*, Stationary knife; *b*, knife bracket; *c*, connecting bracket; *d*, elevating chute; *e*, *f*, left and right side knives recut; *g*, extension board for outer divider lower chain; *h*, *i*, lower and upper special platform boards; *j*, extension board for upper butt conveyor chain; *k*, special brace for platform; *l*, special drive sprocket with 18 teeth; *m*, *n*, *o*, upper rear, lower rear, and front throat springs with brackets; *p*, extension block for upper front throat spring bracket; *q*, extra support board for front throat spring bracket

TABLE 3.—*Bill of materials for low-cutting attachment for Massey-Harris corn binder*

| Material | Size | Used for— | Figure No. | New bolts and rivets required [1] |
|---|---|---|---|---|
| Spring steel | 3 by 5/16 by 28 inches | Stationary knife | 1 | 2 plow bolts, 3/8 by 1¼ inches. |
| Mild steel | 4 by 5/16 by 28 inches | Knife bracket | 40 | 1 machine bolt, ½ by 4½ inches.<br>2 machine bolts, 3/8 by 1 inch. |
| Do | 4 by 3/16 by 9¼ inches | Elevating chute | 43 | None. |
| Do | 4 by 3/16 by 10½ inches | Front throat spring bracket | 55 | 1 machine bolt, 3/8 by 2¼ inches.<br>1 machine bolt, 3/8 by 1¼ inches.<br>2 rivets, ¼ by ¾ inch. |
| Bar iron | 1½ by 5/16 by 7 inches | Connecting bracket | 42 | 2 machine bolts, 3/8 by 1 inch. |
| Do | 1 by ¼ by 26 inches | Special brace | 49 | None. |
| Angle iron | 1½ by 1½ by 3/16 by 5 inches. | Upper rear throat spring bracket. | 51 | 2 carriage bolts, 3/8 by 3 inches.<br>2 rivets, ¼ by ¾ inch. |
| Do | 1½ by 1½ by 3/16 by 7 inches. | Lower rear throat spring bracket. | 54 | 2 machine bolts, 5/16 by 1¾ inches.<br>2 rivets, ¼ by ¾ inch. |
| Pine | 4½ by ½ by 51¼ inches | Upper special platform board. | 46 | None. |
| Do | 4½ by ½ by 42¼ inches | Lower special platform board. | 47 | Do. |
| Do | 5 by 7/8 by 52 inches | Extension butt chain board. | 48 | Do. |
| Do | 5½ by 7/8 by 33½ inches | Extension divider chain board. | 50 | Do. |
| Do | 1½ by 1 by 5 inches | Extension block | 53 | Do. |
| Do | 1⅝ by ½ by 18 inches | Extra support board | 57 | Do. |

MASSEY-HARRIS BINDER PARTS

| Number pieces | Description | Identification |
|---|---|---|
| 6 | Conveyor fingers complete with links | E-432½-E |
| 18 | Plain links for conveyor chain | E-832-C |
| 2 | Conveyor chain finger links | 139-R |
| 4 | Conveyor chain plain links | 55 |

McCORMICK-DEERING BINDER PARTS

| | | |
|---|---|---|
| 1 | Gatherer chain drive sprocket, 18 teeth | C-3053 |

JOHN DEERE BINDER PARTS

| | | |
|---|---|---|
| 3 | Short throat springs with stiffeners | H-1201 |

[1] The total new bolts and rivets which it is necessary to procure are as follows: 2 plow bolts, 3/8 by 1¼ inches; machine bolts—1, ½ by 4½ inches; 1, 3/8 by 2¼ inches; 1, 3/8 by 1¼ inches; 4, 3/8 by 1 inch; 2, 5/16 by 1¾ inches; 2 carriage bolts, 3/8 by 3 inches; 6 rivets, ¼ by ¾ inch.

**Knife bracket.**—The knife bracket, (fig. 40), holds the stationary knife in position, as shown in Figure 37. The notch between the eyes at the front end may be made 4 inches deep before the eyes are formed. The eyes straddle the right gatherer angle and right gatherer angle brace, to which they are fastened by a bolt passing through the forward bolt hole, where the gatherer angle and brace are bolted together, as shown in Figure 41. The rear end of the bracket is bolted to the connecting bracket next described.

**Connecting bracket.**—The connecting bracket, (fig. 42), holds the rear end of the knife bracket and is bolted to the right gatherer angle and right gatherer angle brace. For making the connection one hole must be drilled in the gatherer angle and one in its brace, as shown in Figure 41.

**Elevating chute.**—The elevating chute, (figs. 43 and 44), should be shaped accurately. The flat steel plate is cut to the dimensions shown at A in Figure 43 and heated and hammered to the form shown at B in Figure 43 and by the photograph, Figure 44. The right edge is turned down and rolled under slightly to avoid catching grass and trash; the rear part is bent up and made somewhat concave; the outside rear corner is made highest to keep the cut cornstalks from sliding off into the sickle. Much of the finishing work can be done by hammering without heating. The chute is fastened to the under side of the left gatherer angle, just below the left side knife, by the regular side-knife bolt.

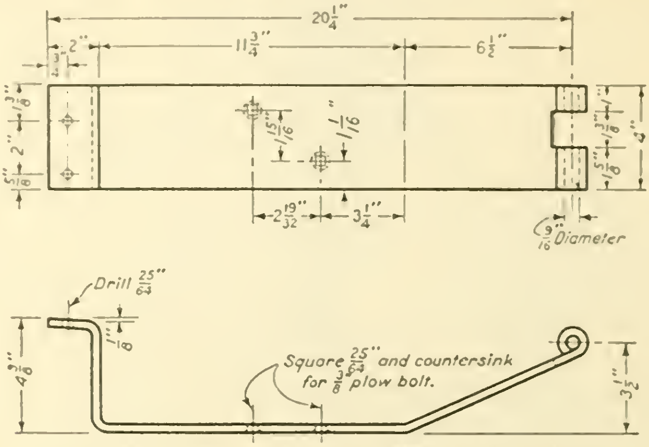


FIGURE 40.—Knife bracket for Massey-Harris corn binder

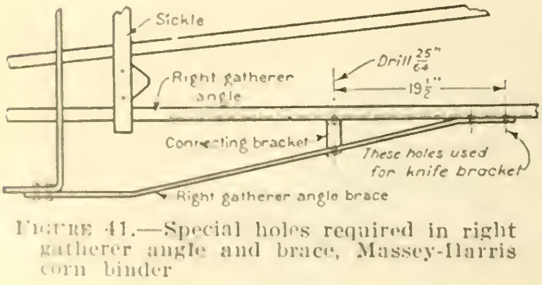


FIGURE 41.—Special holes required in right gatherer angle and brace, Massey-Harris corn binder

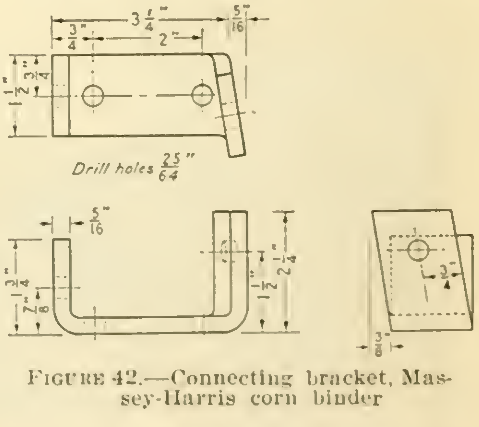


FIGURE 42.—Connecting bracket, Massey-Harris corn binder

**Side knives.**—The side knives, (fig. 45), are partly cut away, the left knife to give space for the elevating chute and the right knife to give clearance and prevent clogging in the throat. The right side knife is to be sharpened also, as shown in the figure.

**Upper butt conveyor chain.**—The upper butt conveyor chain must be lengthened to grasp the cornstalks as they are cut by the stationary knife. This is done by adding 18 plain links, (No. E–832–C), and 6 links with fingers, (No. E–432½–E), made by the manufacturer of this binder, which requires the installation of two new platform boards, as stated in the following paragraph.

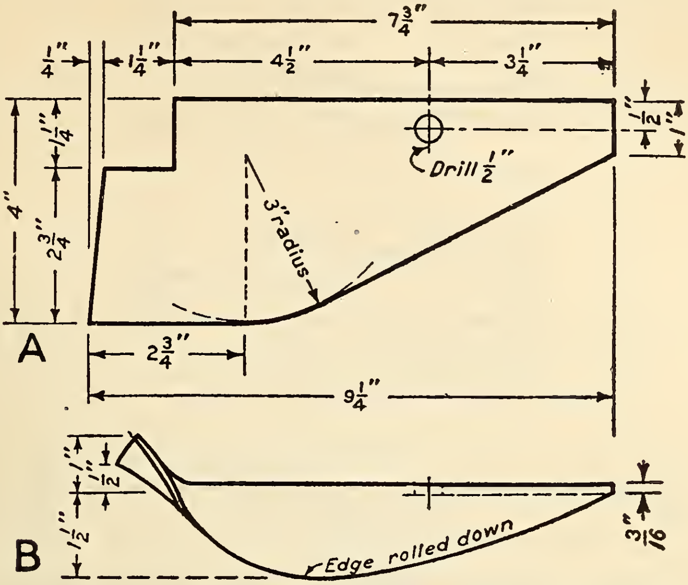


Figure 43.—Elevating chute, Massey-Harris corn binder

**Special platform boards.**—Special platform boards, (figs. 46 and 47), are put in place of the two regular platform boards that hold the front idler sprocket assembly of the upper butt conveyor chain, as shown in Figure 37, and the idler sprocket assembly is attached to the new boards.

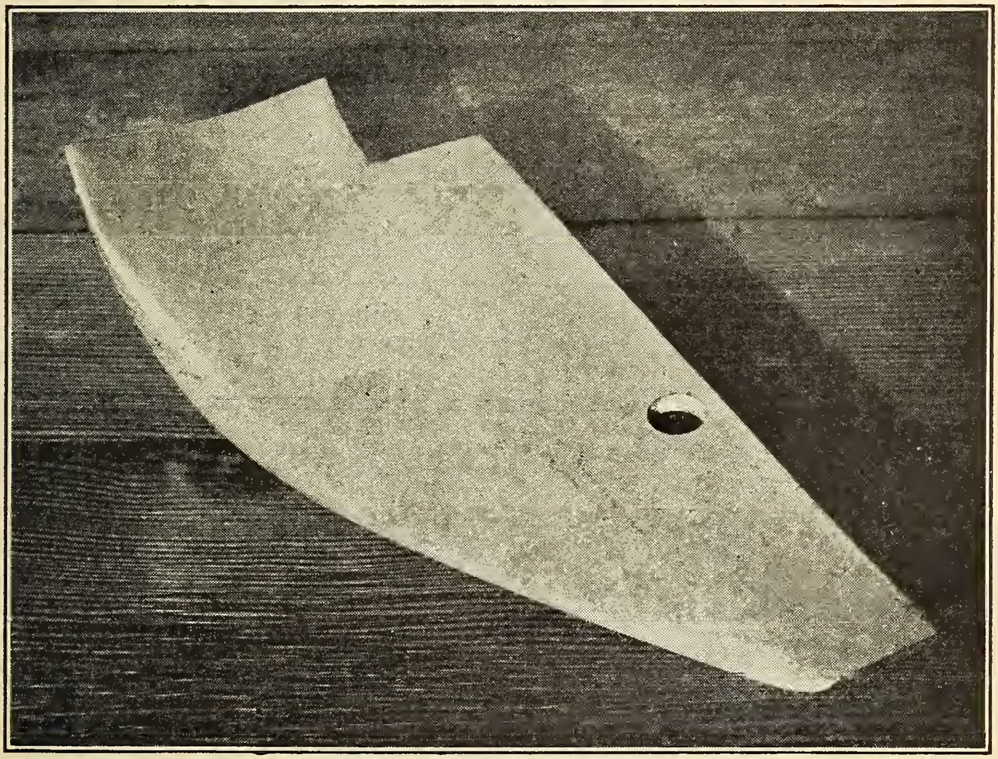


Figure 44.—Elevating chute, Massey-Harris corn binder

**Extension butt chain board.**—The extension butt chain board, (fig. 48), replaces the regular support board for the upper butt conveyor chain.

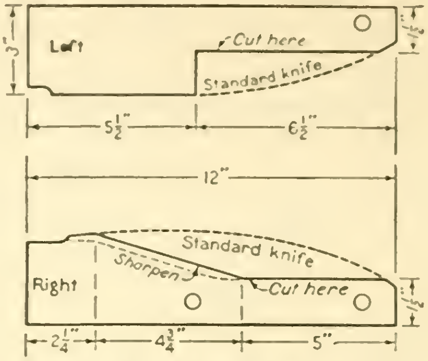


Figure 45.—Side knives recut. Massey-Harris corn binder

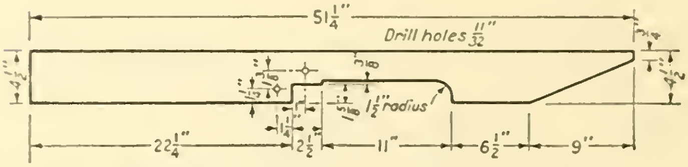


Figure 46.—Upper special platform board, Massey-Harris corn binder

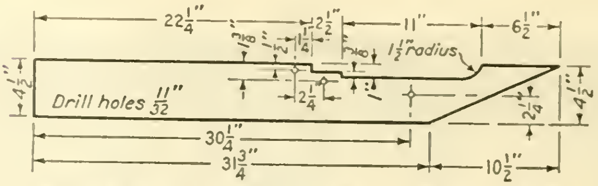


Figure 47.—Lower special platform board, Massey-Harris corn binder

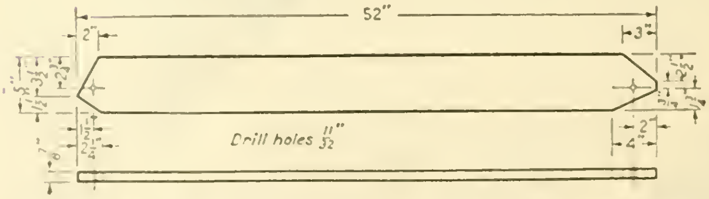


Figure 48.—Extension butt chain board, Massey-Harris corn binder

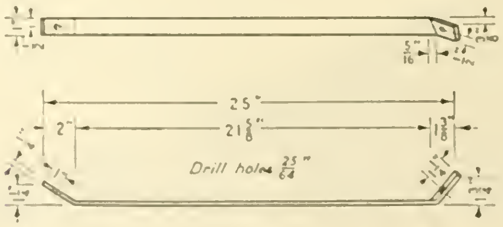


Figure 49.—Special brace for platform, Massey-Harris corn binder

**Special brace.**—A special brace, (fig. 49), replaces the regular brace E–650. Its front end is held by the top bolt that fastens the right end of the platform brace to the platform, and the other end is secured to the point where the brace E–650 is regularly attached.

**Outer divider lower chain.**—The outer divider lower chain, also, must be lengthened. This is done by adding four plain links, (No. 55), and two finger links, (No. 139–R), which are made by the manufacturer of this binder.

**Extension divider chain board.**—The extension divider chain board, (fig. 50), is put in place of the regular bottom board E–931–D of the outer divider lower chain assembly.

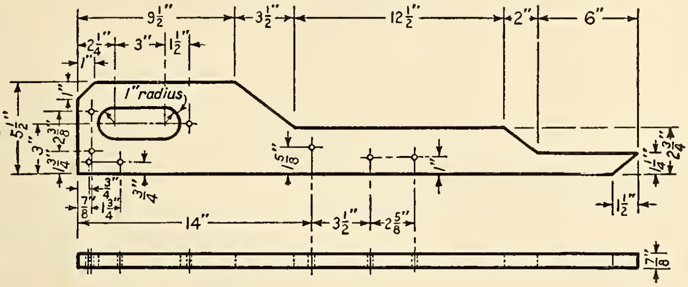


Figure 50.—Extension divider chain board, Massey-Harris corn binder

**Right gatherer chain drive sprocket.**—The speed of the right gatherer chain must be increased to equal the forward travel of the binder. This is done by putting an 18-tooth sprocket in place of the 15-tooth drive sprocket R–424 on the lower end of the left conveyor drive shaft. The new sprocket is bought as McCormick-Deering gatherer chain sprocket No. C–3053, with 18 teeth. The hub of this sprocket must be reamed out to $1\frac{1}{16}$ inches diameter, the keyway must be cut deeper, and a hole must be drilled and tapped for a $\frac{3}{8}$-inch set screw.

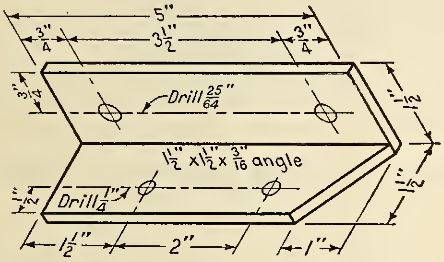


Figure 51.—Upper rear throat-spring bracket, Massey-Harris corn binder

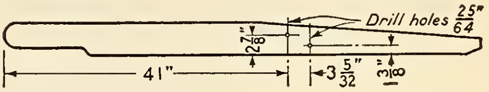


Figure 52.—Special holes required in "board for the outer divider, upper," Massey-Harris corn binder

**Throat springs.**—The Massey-Harris corn binder regularly has no throat springs, but with the low-cutting attachment three throat springs are necessary. The proper springs are bought as John Deere short throat springs with stiffeners, No. H–1201. They are riveted to special brackets, (figs. 51, 54, and 55), placed as described in the following paragraphs.

**Upper rear throat-spring bracket.**—The upper rear throat-spring bracket, (fig. 51), is bolted to the underside of the "board for the outer divider, upper," as shown in Figure 37. To do this, two holes in that board must be drilled as shown in Figure 52.

**Extension block.**—An extension block, (fig. 53), is placed between the upper rear throat-spring bracket, described above, and the board to which it is fastened, to hold the spring in correct position.

**Lower rear throat-spring bracket.**—The lower rear throat-spring bracket (fig. 54) is fastened on top of the "board for the outer divider, center." The rivets that secure the connecting strap to that board are taken out, and replaced by two bolts to hold the bracket.

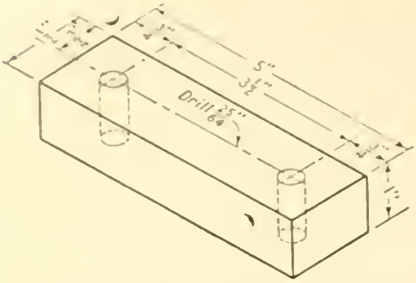


FIGURE 53.—Extension block for upper rear throat-spring bracket, Massey-Harris corn binder

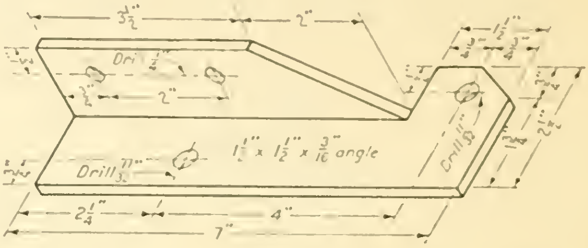


FIGURE 54.—Lower rear throat-spring bracket, Massey-Harris corn binder

**Front throat-spring bracket.**—The front throat-spring bracket, (fig. 55) is fastened to the front of the platform on the left side. (Fig. 38.) The front bolt to hold the bracket passes through the front cross brace, which is just back of the idler sprocket of the left gatherer chain, as shown in Figure 56. The sheet-steel chain guide is removed from the right gatherer chain, and the front throat spring is placed so it will ride on the chain.

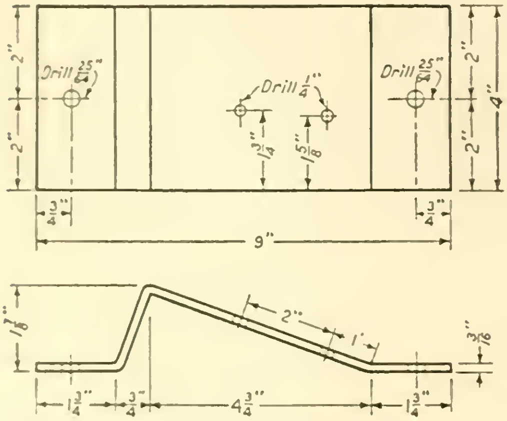


FIGURE 55.—Front throat-spring bracket, Massey-Harris corn binder

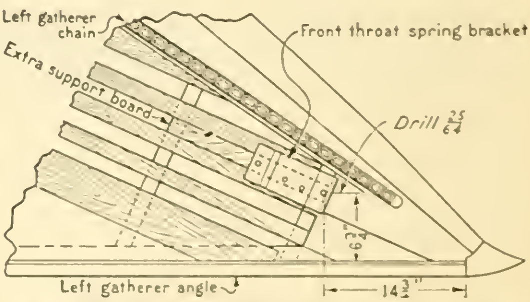


FIGURE 56.—Connection of front throat-spring bracket to platform, Massey-Harris corn binder

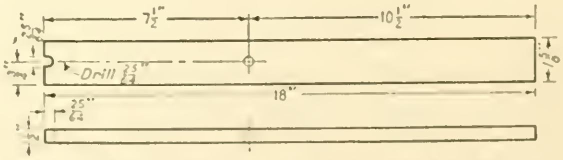


FIGURE 57.—Extra support board for front throat-spring bracket, Massey-Harris corn binder

**Extra support board.**—The extra support board, (fig. 57), is placed under the front throat-spring bracket, between the platform slats, as shown in Figure 56. It is nailed to the cross braces, and its front end is held also by the bolt through the front of the bracket.

### ASSEMBLY FOR McCORMICK-DEERING CORN BINDER

The McCormick-Deering corn binder with the low-cutting device in place is shown in Figures 58 and 59. The separate parts, except those to be purchased from the manufacturer of this binder, are shown in Figure 60. The materials required for making and assembling all the parts, including the manufactured binder parts, are listed in Table 4. Drawings showing the construction of the parts to be made are given in Figures 61 to 75, and instructions for assembling of all parts are given in the following pages.

TABLE 4.—*Bill of materials for low-cutting attachment for McCormick-Deering corn binder*

| Material | Size | Used for— | Figure No. | New bolts and rivets required [1] |
|---|---|---|---|---|
| Spring steel | 3 by 5/16 by 28 inches | Stationary knife | 1 | 2 plow bolts, ⅜ by 1¼ inches. |
| Mild steel | 4 by 5/16 by 25 inches | Knife bracket | 61 | 1 machine bolt, ⅜ by 4 inches.<br>2 machine bolts, ⅜ by 1 inch. |
| Do | 4½ by 3/16 by 10½ inches | Elevating chute | 64 | 2 machine bolts, ⅜ by 1½ inches. |
| Bar iron | 1½ by 5/16 by 8 inches | Connecting plate | 63 | 1 machine bolt, ⅜ by 1 inch.<br>1 machine bolt, ⅜ by 1½ inches. |
| Do | 1¼ by ⅜ by 3 inches | Spacer block | 66 | None. |
| Do | 1 by ⅛ by 17½ inches | Reinforcing strip | 69 | Do. |
| Do | 1 by ¼ by 19 inches | Brace for butt guard | 70 | 1 machine bolt, ⅜ by 1½ inches.<br>1 carriage bolt, ⅜ by 2½ inches. |
| Angle iron | 1½ by 1½ by 3/16 by 7½ inches. | Upper front throat-spring bracket. | 71 | 2 carriage bolts, 5/16 by 3 inches.<br>2 rivets, ¼ by ¾ inch. |
| Do | 1½ by 1½ by 3/16 by 6 inches. | Under front throat-spring bracket. | 72 | 2 carriage bolts, 5/16 by 1½ inches.<br>2 rivets, ¼ by ¾ inch. |
| Do | 2 by 2 by 3/16 by 7¼ inches | Special lower throat-spring bracket. | 74 | 2 machine bolts, ⅜ by 1 inch. |
| Sheet iron | 20-gage 13 by 45 inches | Butt guard | 68 | 3 rivets, ¼ by ⅝ inch.<br>2 machine bolts, 5/16 by ¾ inch. |
| Iron wire | No. 9, 39 inches | Top of butt guard | 68 | None. |
| Pine | 1 by ⅞ by 40 inches | Extension backing strip | 75 | 2 carriage bolts, 5/16 by 5 inches.<br>1 carriage bolt, 5/16 by 4¼ inches. |

McCORMICK-DEERING CORN-BINDER PARTS

| Number of pieces | Description | Identification |
|---|---|---|
| 1 | Butt gatherer chain board, with sill connection | C–13214 |
| 1 | Upper rear butt gatherer chain guide | C–13216 |
| 1 | Upper front butt gatherer chain guide | C–13310 |
| 6 | Lugged links | 6–A |
| 11 | Plain links | 2–A |
| 1 | Throat spring | CC–1461 |

JOHN DEERE CORN-BINDER PARTS

| | | |
|---|---|---|
| 2 | Short throat springs with stiffeners | H–1201 |

---

[1] The total new bolts and rivets which it is necessary to procure are as follows: 2 plow bolts, ⅜ by 1¼ inches; machine bolts—1, ⅜ by 4 inches; 4, ⅜ by 1½ inches; 5, ⅜ by 1 inch; 2, 5/16 by ¾ inch; carriage bolts—1, ⅜ by 2½ inches; 2, 5/16 by 5 inches; 1, 5/16 by 4¼ inches; 2, 5/16 by 3 inches; 2, 5/16 by 1½ inches; rivets—4, ¼ by ¾ inch; 3, ¼ by ⅝ inch.

**Knife bracket.**—The knife bracket, (fig. 61), which holds the stationary knife, is fastened between the right gatherer angle and the right gatherer angle brace as shown in Figure 58. The front end of the plate is trimmed to 3 inches wide for a length of 3½ inches before the eye or loop is formed. The bolt through the eye passes through holes to be drilled in the gatherer angle and brace as shown in Figure 62. The rear of the bracket is bolted to the small connecting plate next described.

**Connecting plate.**—The connecting plate, (fig. 63), to hold the rear end of the knife bracket is bolted to the right gatherer angle and its brace, in which holes must be drilled as shown in Figure 62.

**Elevating chute.**—The elevating chute, (figs. 64 and 65), is made from a flat plate cut according to the dimensions given at A in Figure 64. By heating and hammering it is shaped as shown at B in Figure 64 and in Figure 65. It is important that this part be made carefully. The lower edge is rolled under slightly, to prevent dragging of trash and grass; the central portion is made somewhat concave; the outside corner is flared up to keep the cornstalks from sliding off into the sickle. Much of the finishing work can be done with the hammer without heating. The chute is fastened with special bolts to the underside of the left gatherer angle below the left side knife.

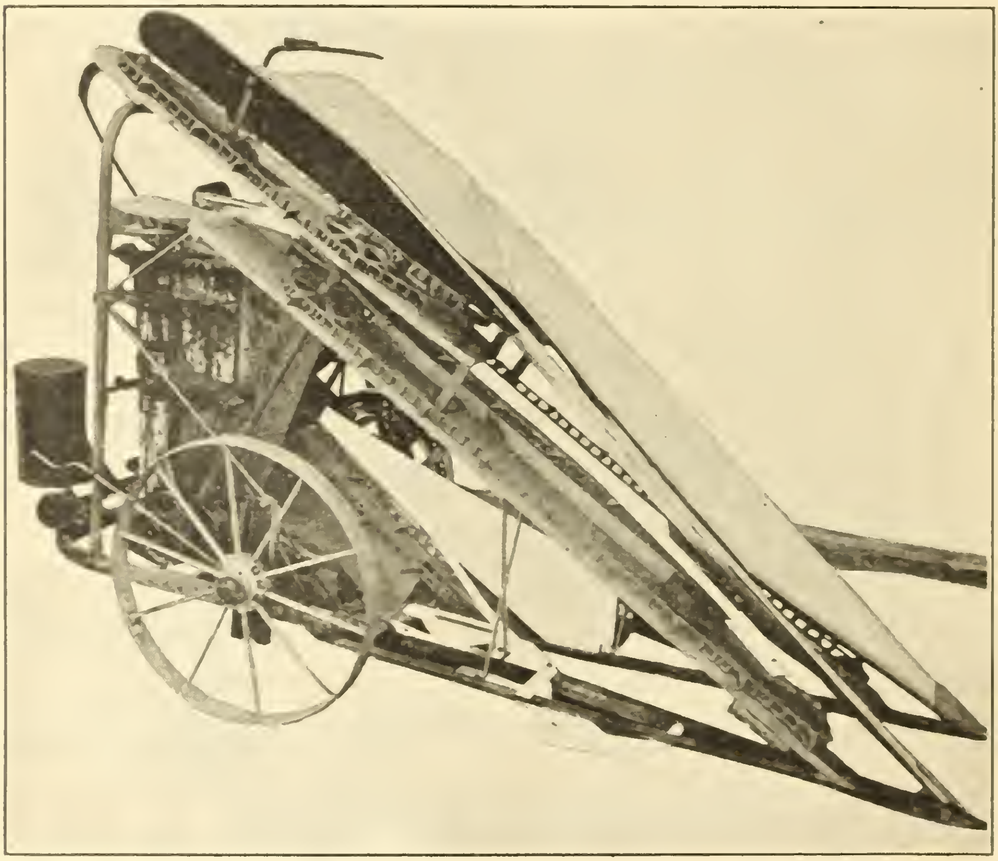


FIGURE 58.—Side view of McCormick-Deering corn binder with low-cutting attachment

**Spacer block.**—A spacer block, (fig. 66), is placed on the front end of the chute between it and the gatherer angle, to hold the left edge of the chute parallel to the top of the gatherer angle.

**Side knives.**—The side knives, (fig. 67), must be partly cut away, the left knife to give space for the elevating chute and the right knife to give clearance and avoid clogging in the throat. The right side knife is to be sharpened as marked in the figure.

**Pitman.**—The pitman of this binder must be lengthened so that the sickle section will register over the right side knife; that is, when in the extreme right position, the center of the sickle section must be over the cutting edge of the side knife.

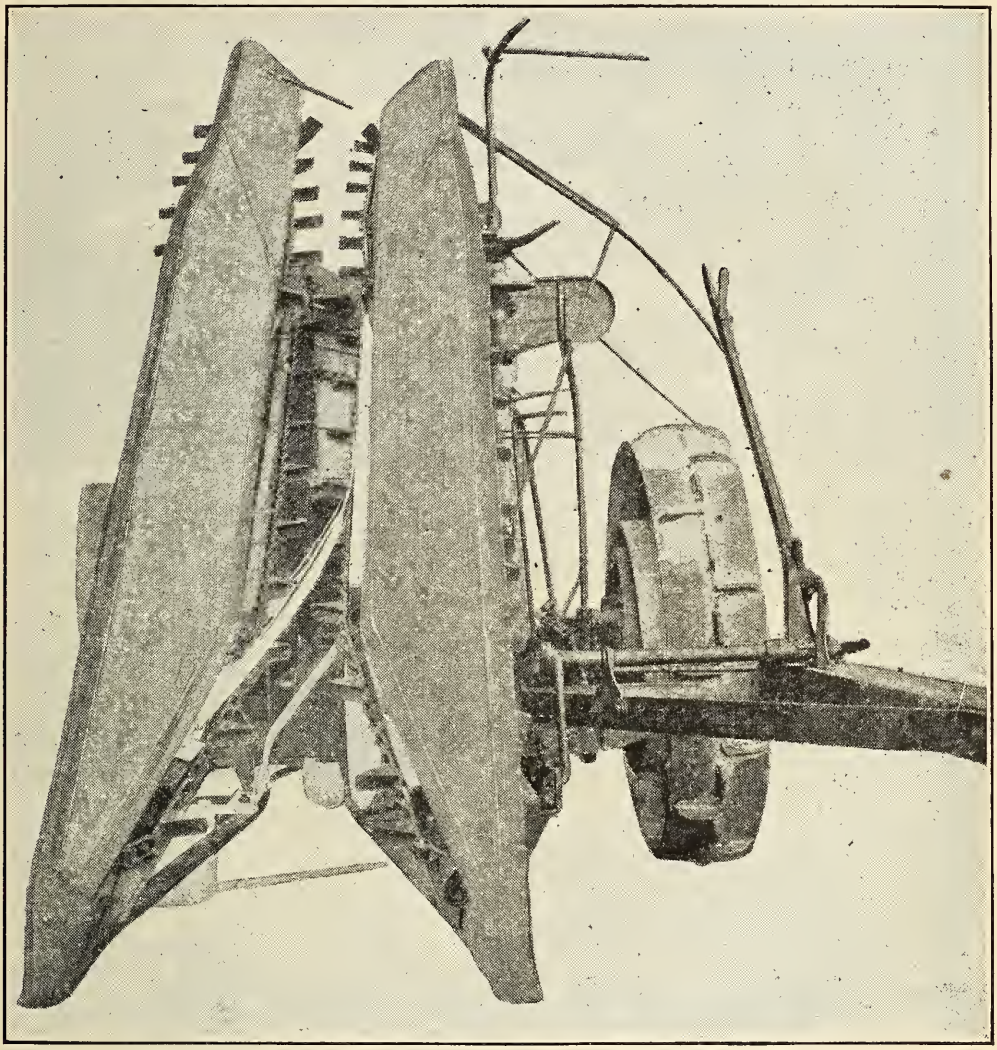


FIGURE 59.—Front view of McCormick-Deering corn binder with low-cutting attachment

**Butt guard.**—The butt guard, (fig. 68), is to prevent the butts of the cut stalks from swinging to the left over the butt gatherer chains. It is shown in position in Figure 58. In laying out this piece, a good plan is to lay out first the bottom edge from the rear corner, (the narrow end of the guard is at the rear), and then mark the upper front corner. The part of the lower edge that is bent at right angles to the face of the guard is bolted to the top of the chain guides on the new butt gatherer chain board that is to be purchased and installed as described in a later paragraph.

**Reinforcing strip.**—A reinforcing strip, (fig. 69), is riveted to the middle portion of the lower edge of the butt guard.

**Brace.**—A brace, (fig. 70), is bolted to the front end of the butt guard to hold it in place. It is fastened between the lower right foot and the upper right foot of the chain board X brace, using bolts one-fourth inch longer than are regularly used to hold that X brace in place.

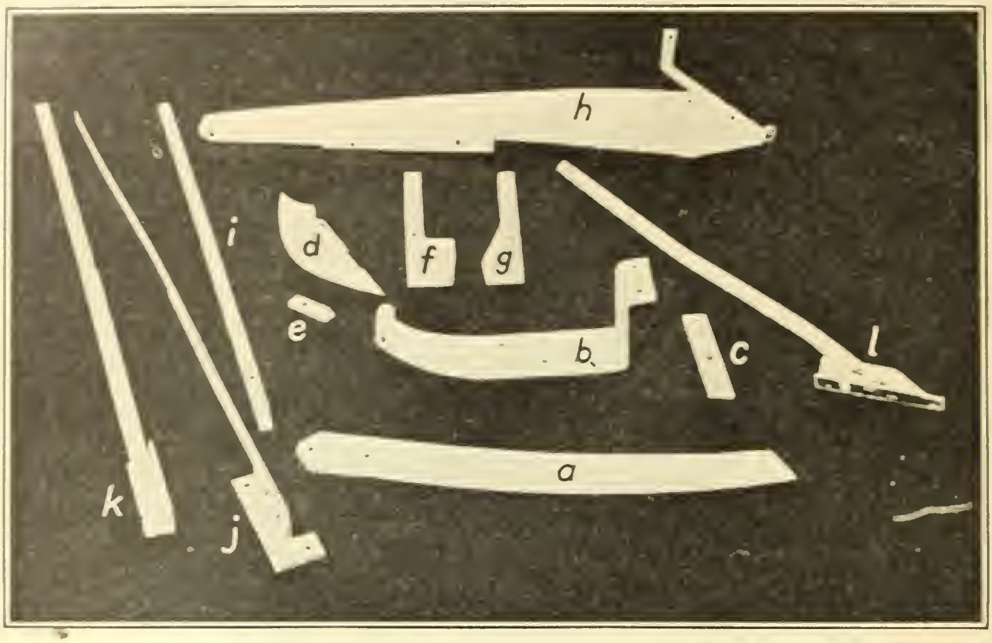


FIGURE 60.—Separate parts of low-cutting attachment for McCormick-Deering corn binder: *a*, Stationary knife; *b*, knife bracket; *c*, connecting plate for knife bracket; *d*, elevating chute; *e*, spacer block for elevating chute; *f*, *g*, left and right side knives recut; *h*, butt guard, with brace attached; *i*, extension backing strip; *j*, *k*, *l*, upper front, under front, and special lower throat springs with brackets

**Upper butt gatherer chain.**—The upper butt gatherer chain must be lengthened to grasp the cornstalks as they are cut by the stationary knife. For this, the additional chain links, new chain board, and new chain guides listed in Table 4 are bought, and are put in place as follows:

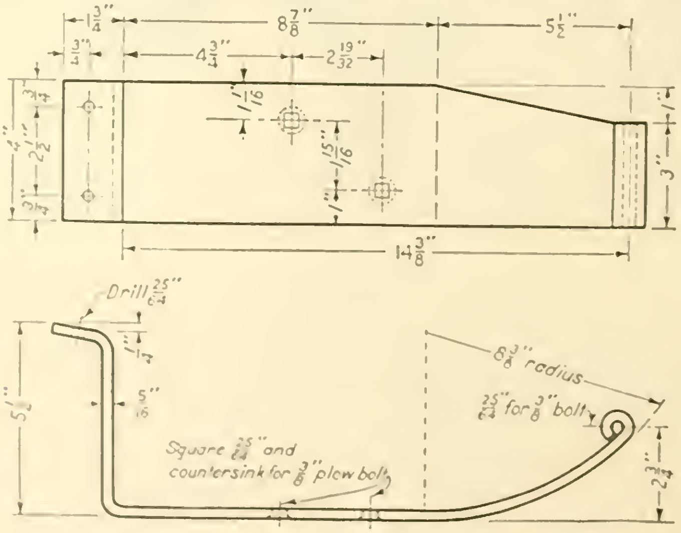


FIGURE 61.—Knife bracket for McCormick-Deering corn binder

(1) The regular butt gatherer chain board and guides are removed from the binder, and in their place are put the new butt gatherer chain board with the sill connections, (No. C–13214) and the new chain guides, (No. C–13216 and No. 13310). The idler sprocket and its assembly are changed from the old to the new board.

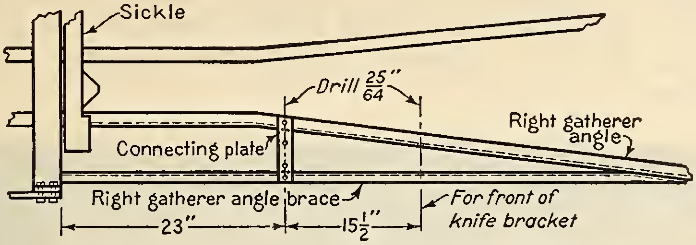


FIGURE 62.—Special holes required in right gatherer angle and brace, McCormick-Deering corn binder

(2) The butt guard, (fig. 68), is fastened on top of the new butt gatherer chain guides, using the same bolts that hold those guides in place.

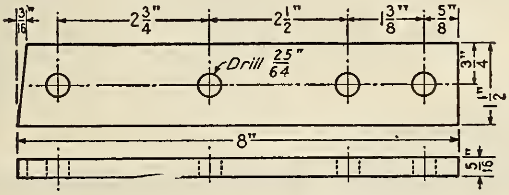


FIGURE 63.—Connecting plate for knife bracket, McCormick-Deering corn binder

(3) The upper butt gatherer chain is reassembled, using 13 lugged links and 39 plain links so that throughout the chain every fourth link will be a lugged link, instead of every fifth link as in the regular assembly. The chain is reversed in position so that the flat side of each lugged link in the throat will be toward the rear of the binder.

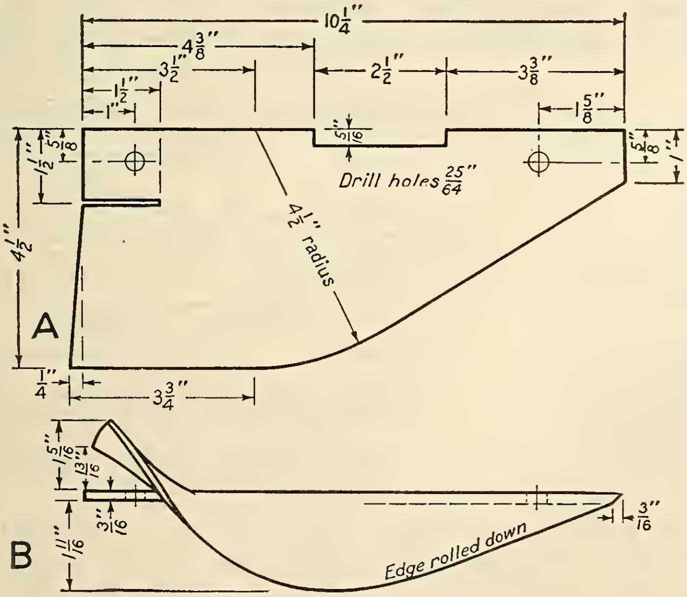


FIGURE 64.—Elevating chute, McCormick-Deering corn binder

**Lower butt gatherer chain.**—The lower butt gatherer chain, also, must be reversed, so that the flat side of the lugged links in the throat will be toward the rear of the binder.

**Throat springs.**—The McCormick-Deering corn binder is regularly equipped with only 1 throat spring, but with the low-cutting attachment 3 additional springs are necessary. One of the additional springs is bought as McCormick-Deering throat spring No. CC–1461; the other two are John Deere short throat springs with stiffeners, No. H–1201. Each of these new springs is held by a special bracket.

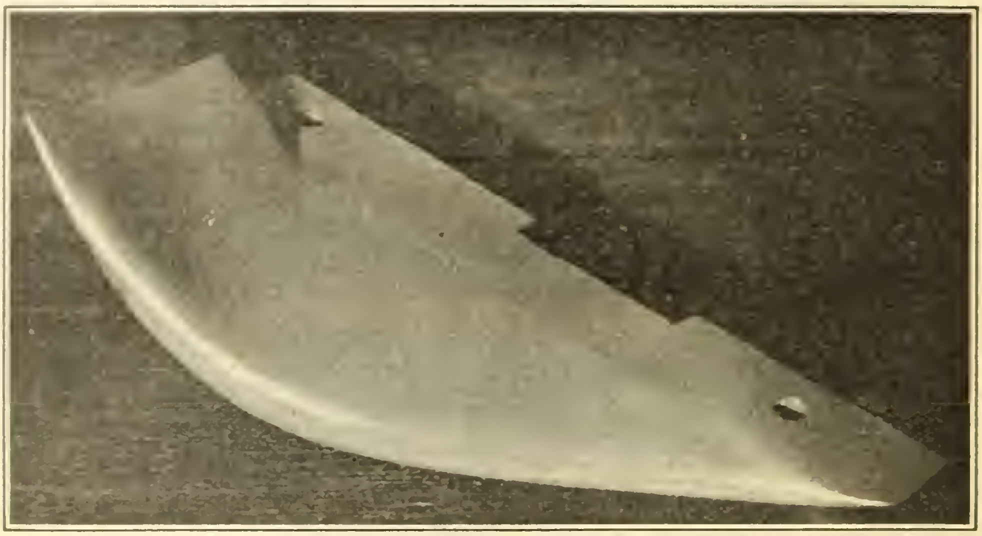


FIGURE 65.—Elevating chute, McCormick-Deering corn binder

**Upper front throat-spring bracket.**—The upper front throat-spring bracket, (fig. 71), is riveted to one of the John Deere springs, as shown in Figure 60. It is bolted on top of the right front chain guide, as shown in Figure 58, using longer bolts through the regular bolt holes.

**Under front throat-spring bracket.**—The under front throat-spring bracket, (fig. 72), is riveted to the other John Deere spring. (Fig. 60.) It is bolted on the underside of the right gatherer chain board, through two holes drilled in that board where shown by Figure 73.

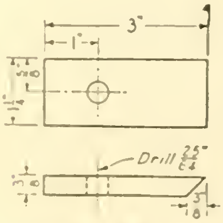


FIGURE 66.—Spacer block for elevating chute, McCormick-Deering corn binder

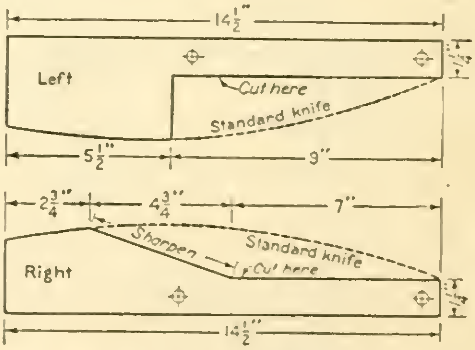


FIGURE 67.—Side knives recut, McCormick-Deering corn binder

**Special lower throat-spring bracket.**—The special lower throat-spring bracket, (fig. 74), is bolted to the McCormick-Deering spring (CC–1461) as shown in Figure 60. It is secured on top of the right gatherer angle, the front end on top of the connecting plate (fig.

63) and the rear end on top of foot of the X brace, (fig. 58), by bolts through those parts.

**Left gatherer chain.**—The left gatherer chain is reversed, so that the flat sides of the lugged links in the throat are toward the rear of the binder, in order to obtain a more positive elevating action.

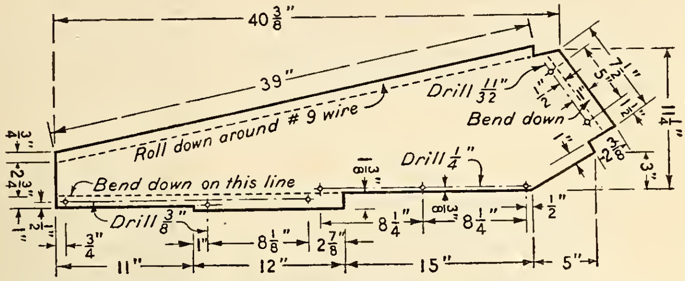


FIGURE 68.—Butt guard, McCormick-Deering corn binder

**Extension backing strip.**—An extension backing strip, (fig. 75), is bolted on top of the left gatherer chain backing board, for the upper front throat spring to rest against.

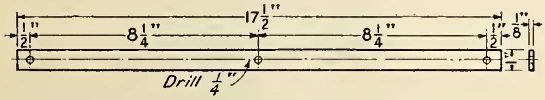


FIGURE 69.—Reinforcing strip for butt guard, McCormick-Deering corn binder

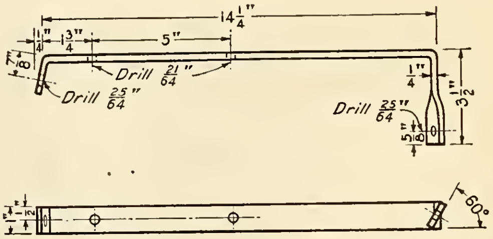


FIGURE 70.—Brace for butt guard, McCormick-Deering corn binder

## OPERATION OF THE CORN BINDERS WITH LOW-CUTTING DEVICE

To obtain best results with this low-cutting device, certain adjustments must be given careful attention.

It is of prime importance that the binder be set to cut the stalks at ground level. To do this, the machine should be kept level and lowered on the wheels. With the gatherer snouts tilted down so that they nearly touch the ground, the stationary knife should slide along at the ground surface when the machine is operating. The binder should not be set so low, however, that the knife will bear against the ground with any appreciable pressure.

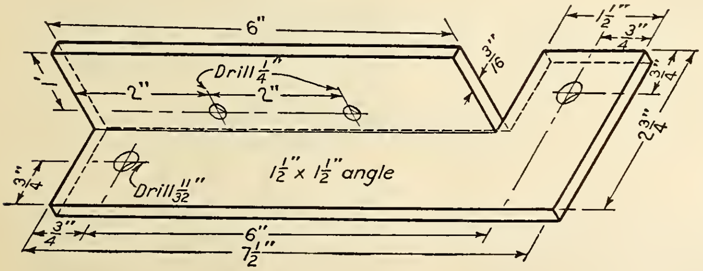


FIGURE 71.—Upper front throat-spring bracket, McCormick-Deering corn binder

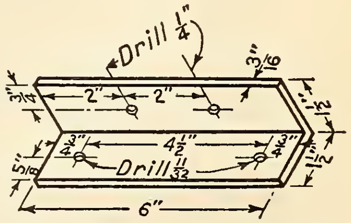
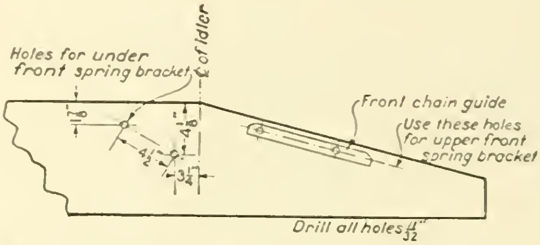


FIGURE 72.—Under front throat-spring bracket, McCormick-Deering corn binder

The gatherer chains, especially those working with the throat springs, must be kept fairly tight—they must not be allowed to sag. The throat springs must maintain considerable pressure against the backing strips, and be kept parallel to the gatherer chains.

The stationary knife should be kept fairly sharp. An extra knife, well sharpened, should be kept ready at all times. A thin, keen cutting edge is necessary in loose sandy or muck soils or for shallow-rooted corn; for gravelly soil the knife edge need not be ground so thin. The edge must be kept free from large nicks, and from unevenness due to wear. To avoid damage to the knife edge, when an obstruction is met in the corn row, the knife can be lifted by raising the gatherer snouts with the tilting lever.



Holes for under front spring bracket
℄ of idler
Front chain guide
Use these holes for upper front spring bracket
4 1/2
3 1/4
Drill all holes 11/32"

FIGURE 73.—Special holes required in right gatherer chain board, McCormick-Deering corn binder

## LOW-CUTTING HAND KNIFE OR HARVESTER HOE

The corn knife or harvesting hoe described in the following pages permits the operator to cut the cornstalks close to the ground surface with very little more labor than is required for hand harvesting with the common corn knives or corn hooks. It can be made by any blacksmith who has equipment for oxyacetylene or electric welding; or the parts may be made on the farm and taken to a shop for the welding.

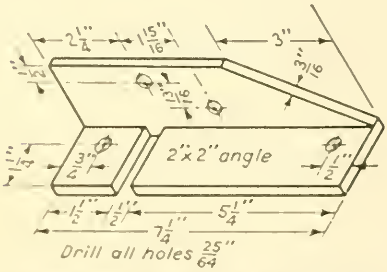


FIGURE 74.—Special lower throat-spring bracket, McCormick-Deering corn binder

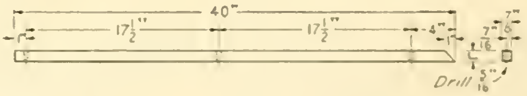
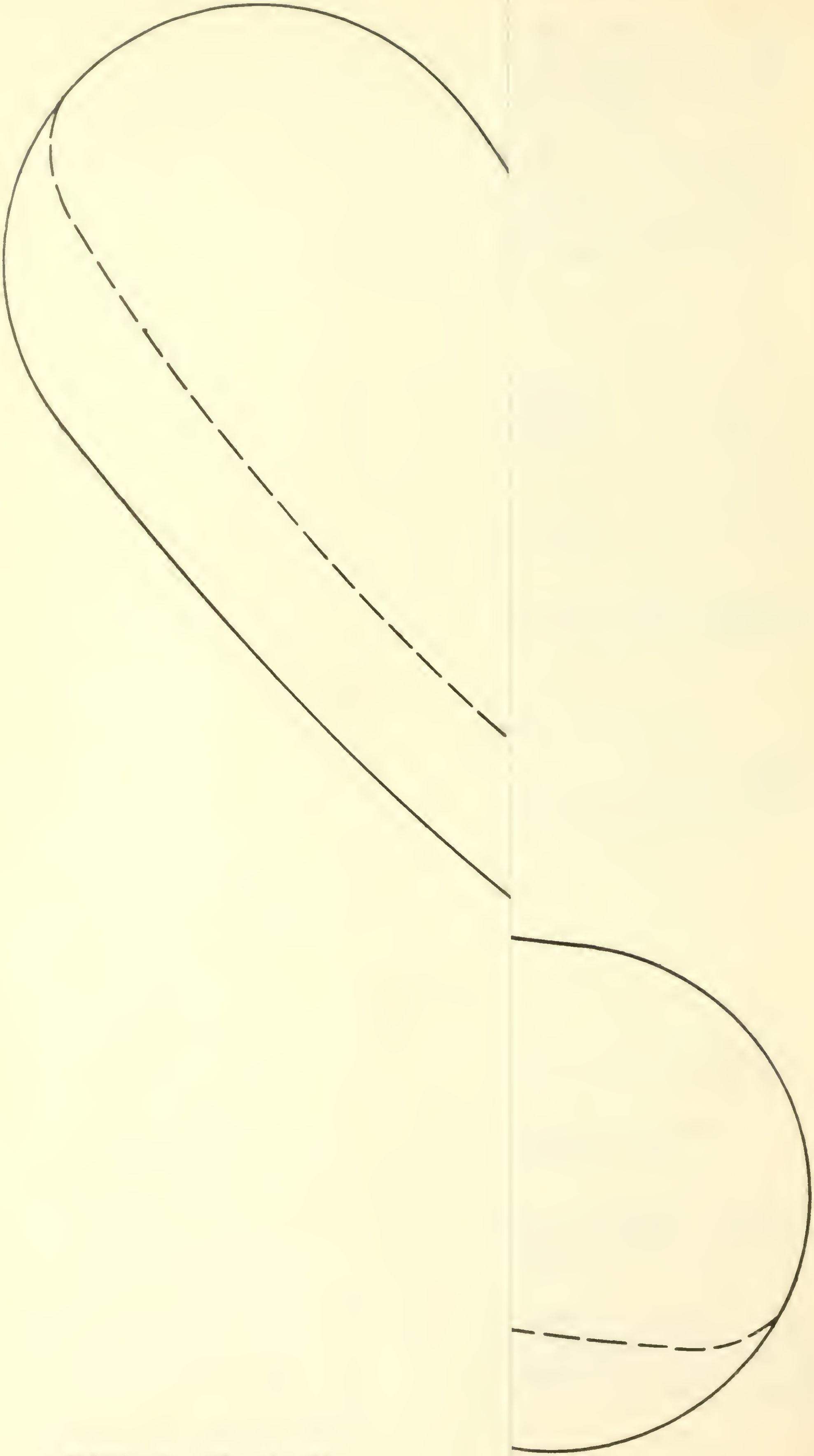


FIGURE 75.—Extension backing strip, McCormick-Deering corn binder

This knife or hoe consists of the blade, the shank or handle socket, and the handle. The shape, size, weight, and balance of the blade, the type of handle, and the angle of the handle to the blade, have been determined after building many types of knives and testing them thoroughly in the field.



60404°—29. (Face page 33.)

## CONSTRUCTION OF THE HAND KNIFE

A picture of the completed low-cutting hand knife is shown in Figure 76. In the following description and drawings, instructions are given for making one of the knives for use by a right-handed man. For a left-handed man, the dimensions for both blade and shank should be reversed.

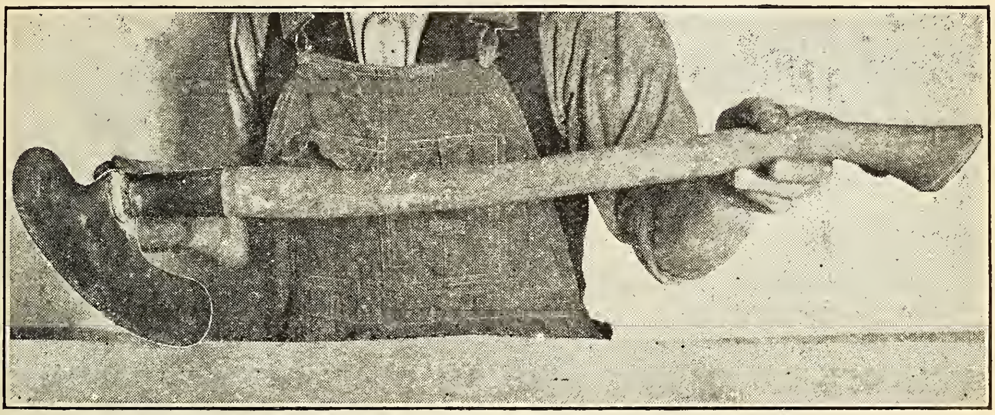


FIGURE 76.—Low-cutting hand knife for harvesting corn

**Blade.**—The blade, (fig. 77), is flat, 5 inches wide by 11¾ inches long and one-eighth inch thick. It should be made of medium carbon steel, and may be cut from an old rolling coulter blade. The outline of the blade and the position of the hole for the shank should be laid out carefully with rule and dividers to the dimensions shown. The line *cd* must be drawn at right angles to line *ab* and be 13 inches long; *d* is the center from which the arcs for the cutting edge and the back of the blade are drawn. The centers from which the various

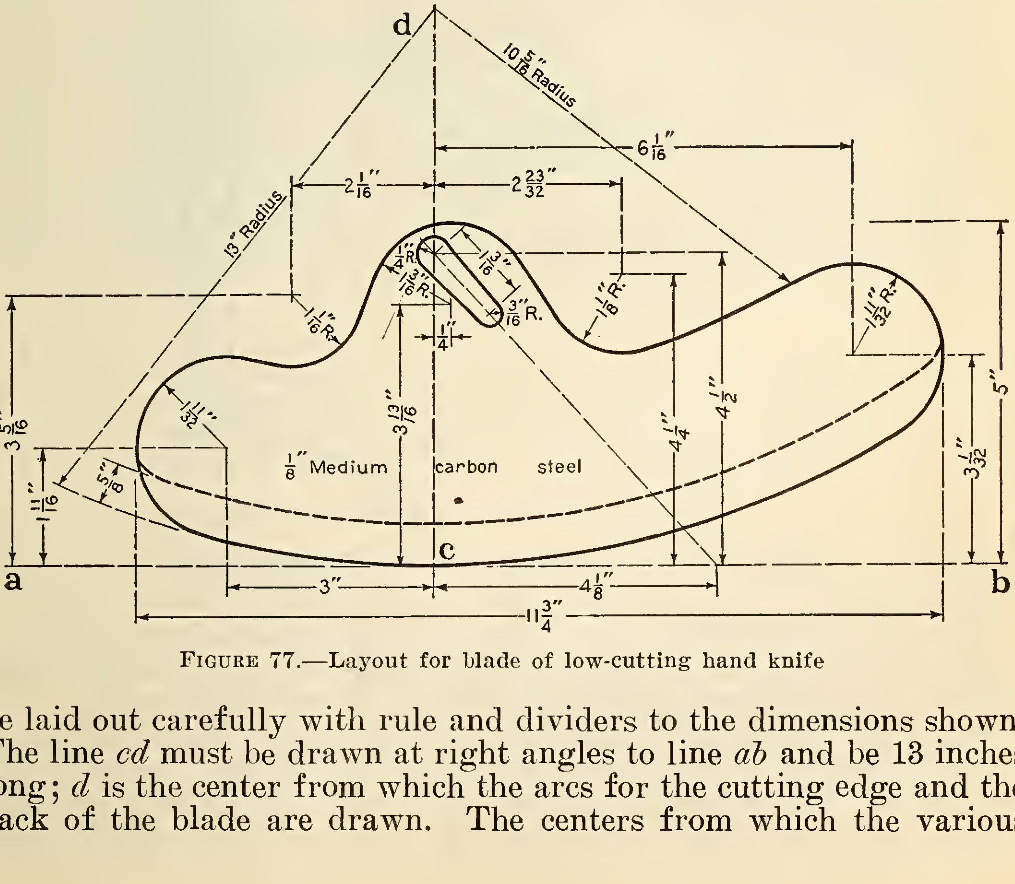


FIGURE 77.—Layout for blade of low-cutting hand knife

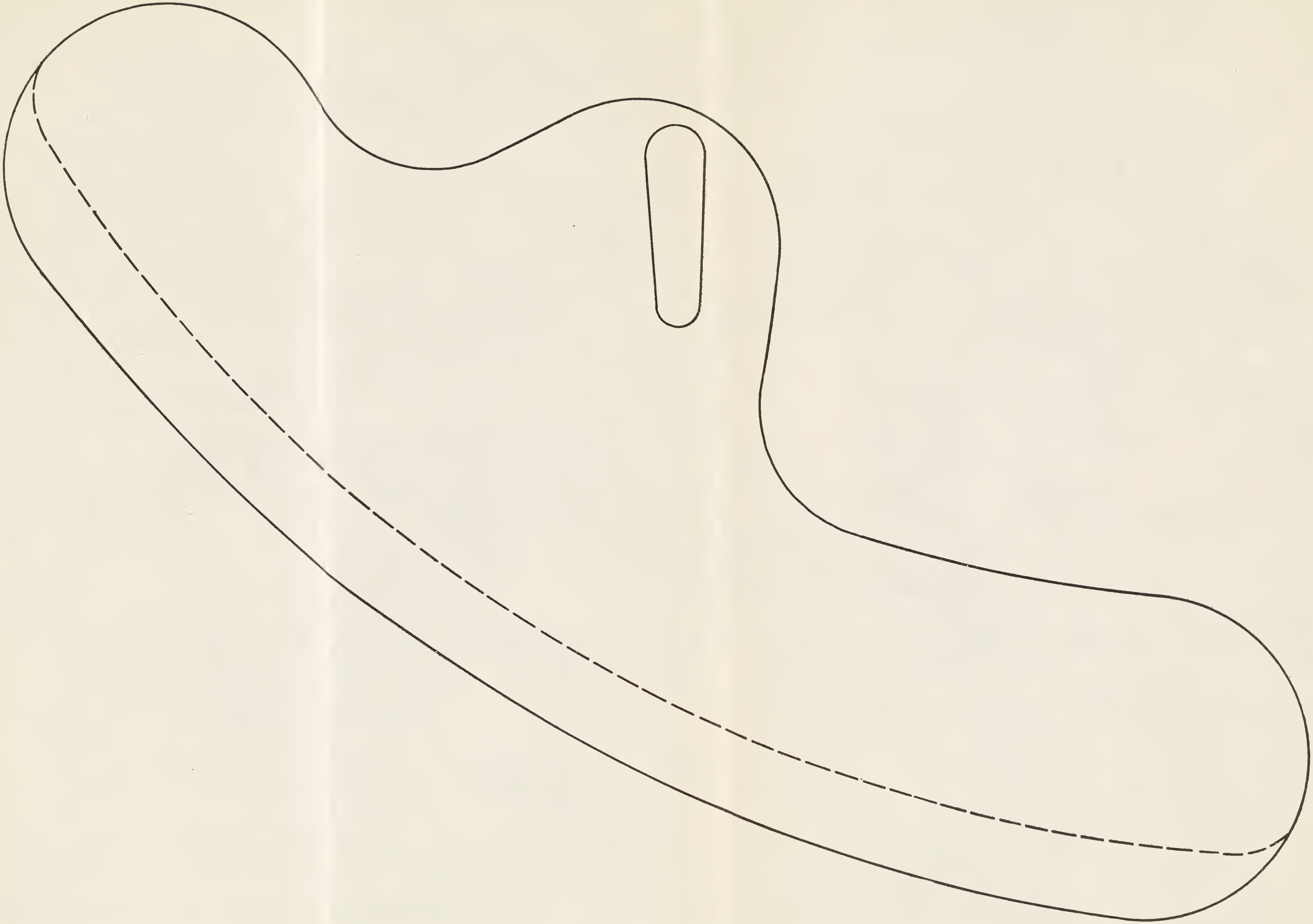


FIGURE 78.—Pattern for blade of low-cutting hand knife

arcs are laid out may be marked on the steel with a punch, or a paper pattern may be made. (Figure 78 may be cut out and used for a pattern.) The blade is cut out roughly with hammer and chisel or with an oxyacetylene torch, as shown in Figure 79, *A*. The piece then is ground to exact shape; the underside of the cutting edge is beveled five-eighths inch wide, by grinding; and the hole for the shank is cut and shaped. (Fig. 79, *B*.)

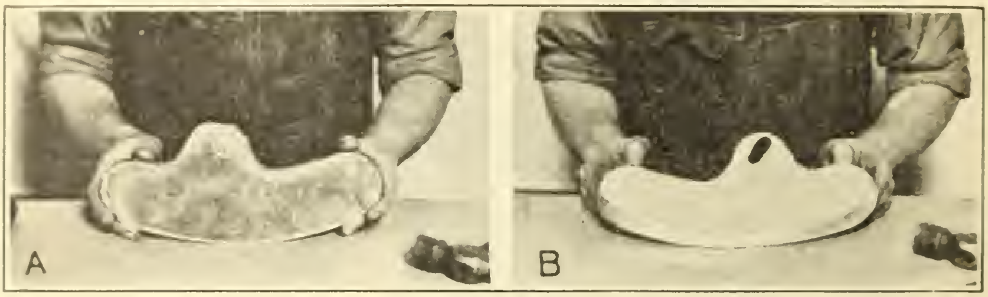


FIGURE 79.—Making the blade, low-cutting hand knife. *A*, Upper side of roughed-out blade; *B*, under side of finished blade

**Shank.**—The shank, (fig. 80), is made from 16-gage sheet metal, cut to the dimensions given, the line, *ab*, being at right angles to the ends of the piece. The piece then is bent along the middle, *ab*, as shown in the top view, and the seam is welded or brazed. The small end of the shank is ground or filed as shown in the side and edge views, in order that the handle will not be quite perpendicular to the blade, but will slant slightly toward the middle of the cutting edge.

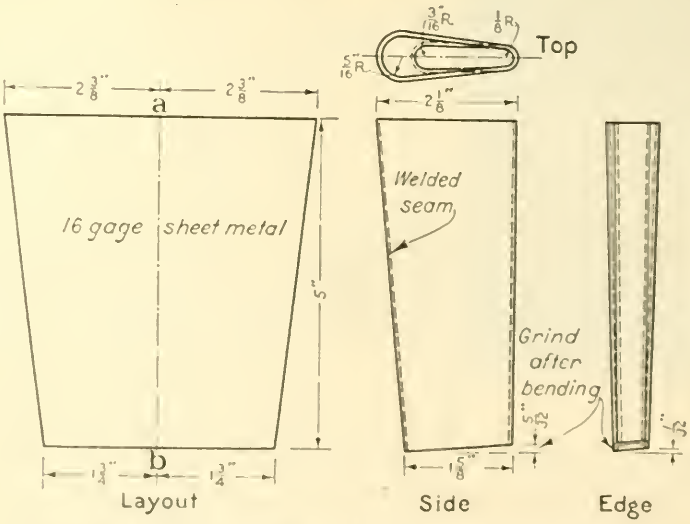


FIGURE 80.—Drawings for the shank, low-cutting hand knife

The small end of the shank is fitted into the hole in the blade so that the end will be just flush with the underside of the blade. The shank and blade then are firmly brazed or welded together.

**Handle.**—The handle should be about 28 inches long and weigh about 12 ounces after being trimmed to fit the shank. An ax handle has proven satisfactory for a man of average height and strength. This is light and affords a firm grip for cutting without any twist or strain on the wrist of the operator. An ax handle is readily obtainable at any hardware store and serves the purpose much better than a round, straight stick. Two stout wood screws may be started in the lower end before it is driven into the shank, and afterward be turned in further for wedging.

### WEIGHT OF THE KNIFE

The weight of the knife determines the ease of cutting with the least exertion on the part of the operator. Tests with many knives have shown that a weight of 34 ounces for the completed knife is about correct for the average man. Of this, the blade and shank described weigh about 22 ounces and the ax handle about 12 ounces.

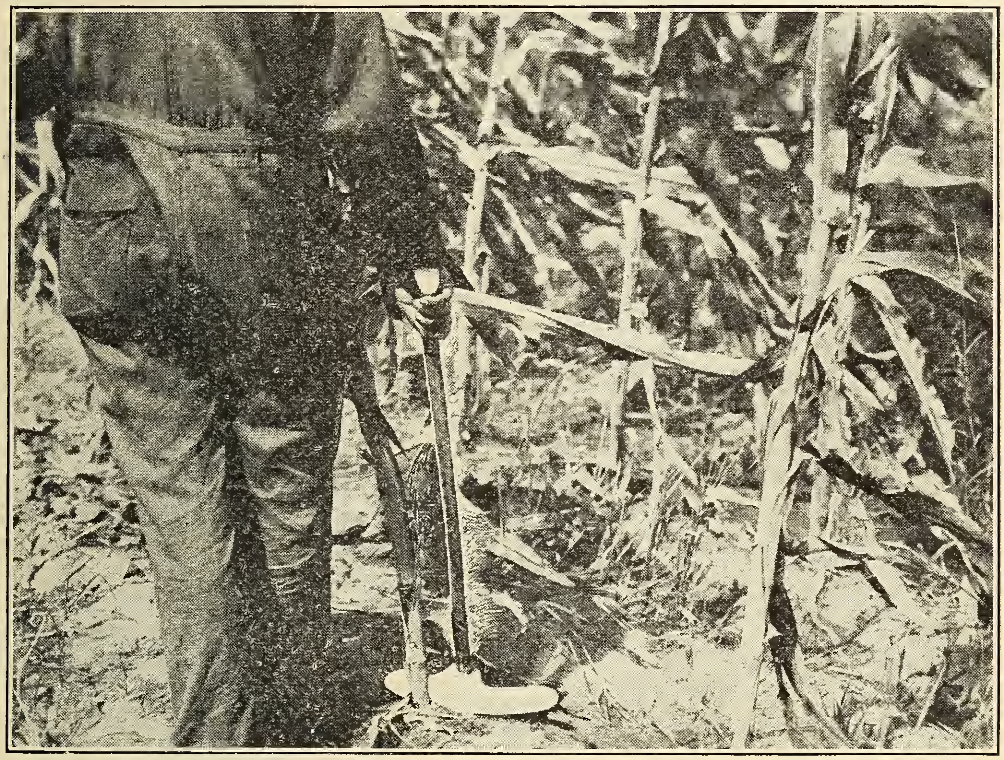


Figure 81.—The knife in position for cutting

In cutting drilled corn, where one stalk is usually cut at a time, the weight of the cutter dropped from a height of about 2 feet is sufficient to sever the stalk with no extra effort by the operator.

### METHOD OF OPERATION

Figure 81 shows the knife in position for cutting. The feet of the operator are not placed parallel to the corn row, but the right foot is in advance and about 45° to the right of the left foot. This permits a backward stroke parallel with a line from one heel to the other of the operator, and leaves several inches clearance between the feet and the knife blade. This method may be used for either hilled or checked corn, but if only checked corn is being cut it is possible to change the position of the feet and strike directly parallel with the corn row.

The stalks are grasped in the left hand and pulled over across the body, which places considerable tension on them and causes them to cut more easily. The stalks accumulating in the arm extend across the body and the long butts protect the right leg. When moving from one hill of corn to the next, as the right leg is advanced preparatory to a stroke it swings the bundle of stalks against the hill which is to be cut.

Use of the low-cutting knife is not more dangerous than use of an ordinary corn knife. The angle at which the handle is set makes it practically impossible to strike the stalk in such a way as to cause the blade to turn and twist the wrist. It will be noticed in Figure 81 that the cut is started on the side of the stalk opposite the feet. If a stone or a side stroke should cause the knife to glance off the stalk, it would move away from the operator.

Experience indicates that harvesting corn with this "hoe" is not appreciably more laborious or slow than with an ordinary corn knife, and will be helpful in combating the European corn borer. The instrument made as described in the foregoing paragraphs is so balanced that it hangs in proper position for easiest cutting of the stalks.

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